

Appendix A Compliance Forms

<i>Compliance Form</i>	<i>Length</i>	<i>2001 Changes</i>
CF-1R – Certificate of Compliance	3 Pages	
MF-1R – Mandatory Measures Checklist	2 Pages	
WS-1R – Thermal Mass Worksheet	1 Page	
DHW-1 – Water Heating Worksheet	1 Page	
DHW-2A – Single Family w/Multiple Heaters	1 Page	
DHW-2B – Multi-Family Buildings	1 Page	
DHW-3 – Indirect & Large Storage Gas Water Heaters	1 Page	
DHW-5 – Combined Hydronic Space and Water Heating	1 Page	
Form 3R – Proposed Construction Assembly	1 Page	
Form S – Solar Heat Gain Coefficient (SHGC) Worksheet	2 Pages	Revised to eliminate credit for interior shading
CF-4R – Certificate of Field Verification Diagnostic Testing	7 Pages	Revised to include refrigerant charge and airflow testing
CF-6R – Installation Certificate	13 Pages	Revised to include refrigerant charge and airflow testing
IC-1 – Insulation Certificate	1 Page	

Project Title _____
 Project Address _____
 Documentation Author _____ Telephone _____
 Compliance Method (Package or Computer) _____ Climate Zone _____

Date _____
 Building Permit # _____
 Plan Check / Date _____
 Field Check / Date _____
 Enforcement Agency Use Only

GENERAL INFORMATION

Total Conditioned Floor Area _____ ft² Average Ceiling Height: _____ ft
 Conditioned Slab Floor Area _____ ft²
 Building Type: _____ Single Family _____ Addition
 (check one or more) _____ Multi-Family _____ Existing-Plus-Addition

Front Orientation: _____ North / South / East / West / All Orientations
 (input front orientation in degrees from True North and circle one)

Number of Stories _____
 Number of Dwelling Units: _____
 Floor Construction Type: Slab/Raised Floor (circle one or both)

RADIANT BARRIER (required in climate zones 2, 4, 8-15) Required for this submittal ___ yes ___ no

BUILDING ENVELOPE INSULATION

Component Type	Frame Type wd = wood stl = steel	Cavity Insulation R-Value	Sheathing Insulation R-Value	Total R-Value ¹	Assembly U-Factor ¹	Location/Comments (attic, garage, typical, etc.)
Wall						
Wall						
Roof						
Roof						
Floor						
Floor						
Slab Edge						

¹For prescriptive compliance, Total R-Value and Assembly U-Factor are not required for a wood-framed wall that meets cavity R-value insulation requirements for the Prescriptive Package.

FENESTRATION

Shading Devices

Fenestration #/Type/Pos.	Orien- tation	Area (ft ²)	Fenestration U-Factor	Fenestration SHGC	Exterior Shading Att.	Overhangs/ Fins
Front						
Front						
Left						
Left						
Rear						
Rear						
Right						
Right						
Skylight						
Skylight						

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 or 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	Heat Pump Configuration (split or package)
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

SEALED DUCTS and TXVs (or Alternative Measures)

- Sealed Ducts (all climate zones)
(Installer testing and certification and HERS rater field verification required)
- TXVs, readily accessible (climate zones 2 and 8-15 only)
(Installer testing and certification and HERS Rater or field verification required)
- Refrigerant Charge/Air Flow (climate zones 2 and 8-15 only)
(Installer testing and certification and HERS Rater or field verification required)

OR

- Alternative to Sealed Ducts and TXVs (see Package C or D Alternative Package Features for Project Climate Zone)

Climate Zone	Window SHGC	Window U-Factor	SEER	Heating
_____	_____	_____	_____	_____

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 water heaters (rated inputs of less than or equal to 75,000 Btu/hr), electric resistance, and heat pump water heaters, list Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Rated Input, Recovery Efficiency and Standby Loss. For instantaneous gas water heaters, list rated input and recovery efficiencies.

SPECIAL FEATURES (add extra sheets if necessary). **Package C and D: TXVs, Sealed Ducts, Radiant Barriers** (see installation requirements for radiant barriers in Section 8.13 of the 2001 Residential Manual). **Package C: thermal mass** (thermal mass type, covering, thickness, and description).

Project Title _____

Date _____

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. The undersigned recognize that compliance using duct sealing and TXVs requires installer testing and certification and field verification by an approved HERS rater.

Designer or Owner (per Business and Professions Code)

Documentation Author

Name: _____

Name: _____

Title/Firm: _____

Title/Firm: _____

Address: _____

Address: _____

Telephone: _____

Telephone: _____

Lic. #: _____

(signature) (date)

(signature) (date)

Enforcement Agency

Name: _____

Title: _____

Agency: _____

Telephone: _____

(signature / stamp) (date)

MANDATORY MEASURES CHECKLIST: RESIDENTIAL (Page 1 of 2) 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 minimum component performance specifications for the mandatory measures whether they are shown elsewhere in the documents or on this checklist only.

Instructions: Check or initial applicable boxes when completed or enter N/A if not applicable.

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 wood framed walls or equivalent U-Factor in metal frame walls (does not apply to exterior mass walls).		
* § 150(d): Minimum R-13 raised floor insulation in framed 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 insulation quality standards. Indicate type and form.		
§ 116-17: Fenestration Products, Exterior Doors, and Infiltration/Exfiltration Controls 1. Doors and windows between conditioned and unconditioned spaces designed to limit air leakage. 2. Fenestration products (except field-fabricated) have label with certified U-Factor, certified Solar Heat Gain Coefficient (SHGC), and infiltration certification. 3. 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 pilot lights allowed.		
Space Conditioning, Water Heating and Plumbing System Measures:		
§ 110-§113: HVAC equipment, water heaters, showerheads and faucets certified by the Commission.		
§ 150(h): Heating and/or cooling loads calculated in accordance with ASHRAE, SMACNA or ACCA.		
§ 150(i): Setback thermostat on all applicable heating and/or cooling systems.		
§ 150(j): Pipe and tank insulation 1. Storage gas water heaters rated with an Energy Factor less than 0.58 must be externally wrapped with insulation having an installed thermal resistance of R-12 or greater. 2. First 5 feet of pipes closest to water heater tank, non-recirculating systems, insulated (R-4 or greater) 3. Back-up tanks for solar system, unfired storage tanks, or other indirect hot water tanks have R-12 external insulation or R-16 combined internal/external insulation. 4. All buried or exposed piping insulated in recirculating sections of hot water systems. 5. Cooling system piping below 55° F insulated. 6. Piping insulated between heating source and indirect hot water tank.		

MANDATORY MEASURES CHECKLIST: RESIDENTIAL (Page 2 of 2) 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 minimum component performance specifications for the mandatory measures whether they are shown elsewhere in the documents or on this checklist only.

Instructions: Check or initial applicable boxes when completed or enter N/A if not applicable.

DESCRIPTION	DESIGNER	ENFORCEMENT
Space Conditioning, Water Heating and Plumbing System Measures: (continued)		
<p>* §150(m): Ducts and Fans</p> <ol style="list-style-type: none"> 1. All ducts and plenums installed, sealed and insulated to meet the requirement of the 1998 CMC Sections 601, 603, 604, and Standard 6-3; ducts insulated to a minimum installed level of R-4.2 or enclosed entirely in conditioned space. Openings shall be sealed with mastic, tape, aerosol sealant, or other duct-closure system that meets the applicable requirements of UL 181, UL 181A, or UL 181B. If mastic or tape is used to seal openings greater than 1/4 inch, the combination of mastic and either mesh or tape shall be used. Building cavities shall not be used for conveying conditioned air. Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands. 2. Building cavities, support platforms for air handlers, and plenums defined or constructed with materials other than sealed sheet metal, duct board or flexible duct shall not be used for conveying conditioned air. Building cavities and support platforms may contain ducts. Ducts installed in cavities and support platforms shall not be compressed to cause reductions in the cross-sectional area of the ducts. 3. Joints and seams of duct systems and their components shall not be sealed with cloth back rubber adhesive duct tapes unless such tape is used in combination with mastic and drawbands. 4. Exhaust fan systems have back draft or automatic dampers. 5. Gravity ventilating systems serving conditioned space have either automatic or readily accessible, manually operated dampers. 6. Protection of Insulation. Insulation shall be protected from damage, including that due to sunlight, moisture, equipment maintenance, and wind but not limited to the following: Insulation exposed to weather shall be suitable for outdoor service e.g., protected by aluminum, sheet metal, painted canvas, or plastic cover. Cellular foam insulation shall be protected as above or painted with a coating that is water retardant and provides shielding from solar radiation that can cause degradation of the material. 		
<p>§114: Pool and Spa Heating Systems and Equipment.</p> <ol style="list-style-type: none"> 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: <ol style="list-style-type: none"> a. At least 36" of pipe between filter and heater for future solar heating. b. Cover for outdoor pools or outdoor spas. 3. Pool system has directional inlets and a circulation pump time switch. 		
<p>§115: Gas fired central furnaces, pool heaters, spa heaters or household cooking appliances have no continuously burning pilot light. (Exception: Non-electrical cooking appliances with pilot < 150 Btu/hr)</p>		
<p>§118 (f): Cool Roof material meet specified criteria</p>		
Lighting Measures:		
<p>§150(k)1.: Luminaires for general lighting in kitchens shall have lamps with an efficacy of 40 lumens/watt or greater for general lighting in kitchens. This general lighting shall be controlled by a switch on a readily accessible lighting control panel at an entrance to the kitchen.</p>		
<p>§150(k)2.: Rooms with a shower or bathtub must have either at least one luminaire with lamps with an efficacy of 40 lumens/watt or greater switched at the entrance to the room or one of the alternatives to this requirement allowed in §150(k)2.; and incandescent recessed ceiling fixtures are IC (insulation cover) approved.</p>		

Project Title _____

Date _____

INTERIOR THERMAL MASS:

Thermal mass required for Packages C in Tables No. 1-Z1 through 1-Z16 shall meet or exceed the required interior mass capacity as specified below.

Choose one of the following:

Package C (Slab Floor) $\frac{2.36}{\text{Ground Floor Area}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
Required Interior Mass Capacity

Package C (Raised Floor) $\frac{0.18}{\text{Ground Floor Area}} \times \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$
Required Interior Mass Capacity

Calculate the Interior Mass Capacity value using the worksheet space below. Look up the Unit Interior Mass Capacity for each interior mass surface in the *Residential Manual*, Table 3-12. For interior mass walls exposed on both (two) sides to conditioned space, enter the surface area of only one side.

Description	Mass Area		Unit Interior Mass Capacity		Interior Mass Capacity
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
_____	_____	×	_____	=	_____
Total Interior Mass Capacity			_____	=	_____

The total interior mass capacity must be equal to or greater than the required interior mass capacity in order to meet the thermal mass requirements of Packages C.

 \geq

Total Interior Mass Capacity
Required Interior Mass Capacity

WATER HEATING WORKSHEET

DHW-1

Project Title _____

Date _____

No. of Different Water Heater Types: _____

Total No. of Water Heaters: _____

Conditioned Floor Area (CFA): _____ ft²

Notes: For single family dwellings with multiple water heaters, also submit DHW-2A. For multi-family buildings, also submit DHW-2B.

Heater Type # _____ Data

A. Water Heater Type (check one)

- Storage Gas
- Large Storage Gas
- Storage Electric
- Storage Heat Pump
- Instantaneous Gas
- Instantaneous Electric
- Indirect Gas

B. Manufacturer _____

C. Model No. _____

D. Energy Factor _____

E. Gallons _____

F. Pilot Btu/hr _____

G. Thermal Eff. _____

H. Auxiliary Input (check one or both)

- Wood Stove
- Solar

I. Distribution System (check one)

- Standard
- Hot Water Recovery (HWR)
 - Point of Use (POU)
 - Pipe Insulation (PI)
 - Parallel Piping (PP)
 - Recirculation: No Control
 - Recirculation: Timer
 - Recirculation: Temp.
 - Recirculation: Time/Temp.
 - Recirculation: Demand
 - HWR + Recirculation: Demand
 - PI + Recirculation: Demand

Energy Use Calculation

1a. Standard Recovery Load _____
(from Table 6-5, DHW-2A or 2B)

1b. Distribution Credit/Penalty _____
(from Table 6-6 or 6-7)

1c. Solar Fraction _____
(from Table 6-9)

1d. Solar Energy Credit _____
(1c x 1a)

1e. Adjusted Recovery Load _____
(1a - 1b - 1d)

2a. Basic Energy Use _____
(from Table 6-8, DHW-2B or 3)

2b. Wood Stove Boiler Credit
Factor (from Table 6-10) _____

2c. Wood Stove Boiler Credit _____
(2a x 2b)

2d. Proposed Energy Use _____
(2a - 2c)

3. Standard Energy Use _____
(from Table 6-5)

Heater Type # _____ Data

A. Water Heater Type (check one)

- Storage Gas
- Large Storage Gas
- Storage Electric
- Storage Heat Pump
- Instantaneous Gas
- Instantaneous Electric
- Indirect Gas

B. Manufacturer _____

C. Model No. _____

D. Energy Factor _____

E. Gallons _____

F. Pilot Btu/hr _____

G. Thermal Eff. _____

H. Auxiliary Input (check one or both)

- Wood Stove
- Solar

I. Distribution System (check one)

- Standard
- Hot Water Recovery (HWR)
 - Point of Use (POU)
 - Pipe Insulation (PI)
 - Parallel Piping (PP)
 - Recirculation: No Control
 - Recirculation: Timer
 - Recirculation: Temp.
 - Recirculation: Time/Temp.
 - Recirculation: Demand
 - HWR + Recirculation: Demand
 - PI + Recirculation: Demand

Energy Use Calculation

1a. Standard Recovery Load _____
(from Table 6-5, DHW-2A or 2B)

1b. Distribution Credit/Penalty _____
(from Table 6-6 or 6-7)

1c. Solar Fraction _____
(from Table 6-9)

1d. Solar Energy Credit _____
(1c x 1a)

1e. Adjusted Recovery Load _____
(1a - 1b - 1d)

2a. Basic Energy Use _____
(from Table 6-8, DHW-2B or 3)

2b. Wood Stove Boiler Credit
Factor (from Table 6-10) _____

2c. Wood Stove Boiler Credit _____
(2a x 2b)

2d. Proposed Energy Use _____
(2a - 2c)

3. Standard Energy Use _____
(from Table 6-5)

Heater Type # _____ Data

A. Water Heater Type (check one)

- Storage Gas
- Large Storage Gas
- Storage Electric
- Storage Heat Pump
- Instantaneous Gas
- Instantaneous Electric
- Indirect Gas

B. Manufacturer _____

C. Model No. _____

D. Energy Factor _____

E. Gallons _____

F. Pilot Btu/hr _____

G. Thermal Eff. _____

H. Auxiliary Input (check one or both)

- Wood Stove
- Solar

I. Distribution System (check one)

- Standard
- Hot Water Recovery (HWR)
 - Point of Use (POU)
 - Pipe Insulation (PI)
 - Parallel Piping (PP)
 - Recirculation: No Control
 - Recirculation: Timer
 - Recirculation: Temp.
 - Recirculation: Time/Temp.
 - Recirculation: Demand
 - HWR + Recirculation: Demand
 - PI + Recirculation: Demand

Energy Use Calculation

1a. Standard Recovery Load _____
(from Table 6-5, DHW-2A or 2B)

1b. Distribution Credit/Penalty _____
(from Table 6-6 or 6-7)

1c. Solar Fraction _____
(from Table 6-9)

1d. Solar Energy Credit _____
(1c x 1a)

1e. Adjusted Recovery Load _____
(1a - 1b - 1d)

2a. Basic Energy Use _____
(from Table 6-8, DHW-2B or 3)

2b. Wood Stove Boiler
Credit Factor (from Table 6-10) _____

2c. Wood Stove Boiler Credit _____
(2a x 2b)

2d. Proposed Energy Use _____
(2a - 2c)

3. Standard Energy Use _____
(from Table 6-5)

4. For Prescriptive Compliance (one water heater per dwelling): Line 2d must not exceed Line 3

Project Title _____

Date _____

Note: In addition to this form, a DHW-1 Water Heating Worksheet must also be submitted to document water heater type(s).

Single Family Project Data

1. No. of different water heater types: _____

2. Total conditioned floor area: _____ ft²

	No. of Heaters	Heater Type #	Manufacturer & Model No.
3a.	_____	#1	_____
3b.	_____	#2	_____
3c.	_____	#3	_____

4. _____ Total Number of Water Heaters

5. Standard Recovery Load: _____ from Table 6-5 based on line 2

6. Recovery Load Per Heater: _____ (line 5 ÷ line 4); enter on DHW-1, line 1a for each Heater Type, and complete calculation through line 2d.

7. Proposed Energy Use, Heater #1: _____ (from DHW-1 line 2d, Heater #1) × (line 3a)

8. Proposed Energy Use, Heater #2: _____ (from DHW-1 line 2d, Heater #2) × (line 3b)

9. Proposed Energy Use, Heater #3: _____ (from DHW-1 line 2d, Heater #3) × (line 3c)

10. Total Proposed Energy Use: _____ (line 7 + line 8 + line 9)

11. Standard Energy Use: _____ from Table 6-5 based on line 2

Compliance

12. **Prescriptive Compliance:** Line 10 must be equal to or less than line 11. See Section 6.1 and Chapter 3 in the *Residential Manual* for details.

Project Title _____

Date _____

Notes: In addition to this form, a DHW-1 Water Heating Worksheet must also be submitted to document water heating type(s). If the calculation (line 5) is by "Individual Dwelling Unit" and system configuration (line 6) is "Individual Heaters," no additional information need be entered on this sheet.

Multi-Family Project Data

1. Number of dwelling units: _____
2. Total conditioned floor area: _____ ft²
3. Average floor area: _____ (Line 2/Line 1)
4. Standard Recovery Load: _____ (from Table 6-5 based on Line 3, enter on DHW-1 Line 1a)
5. Calculation by (check one):
 _____ Average Dwelling Unit
 _____ Individual Dwelling Unit
6. System configuration (check one):
 _____ Individual Heaters (one per dwelling unit)
 _____ Shared Heaters (multiple dwelling units per heater)

Analysis by Average Dwelling Unit

One Individual Heater Per Dwelling Unit

	No. of Heaters	Heater Type#	Manufacturer and Model#	Gallons		Energy Factor		Thermal Efficiency	
				Each	Total ¹	Each	Total ²	Each	Total ³
7a =									
7b =									
7c =									
8a =				8b =		8c =		8d =	
	Total			Total		Total		Total	
				9a =	Ave. (8b/8a)	9b =	Ave. (8c/8a)	9c =	Ave. (8d/8a)

Individual Heaters

- 10a. Enter value 9a on DHW-1 Line E.
- 11a. Enter value 9b on DHW-1 Line D.
- 12a. Enter value 9c on DHW-1 Line G.
- 13a. Check compliance on DHW-1 for average dwelling unit and average water heating.

Shared Heater(s)

- 10b. Average unit Adjusted Recovery Load: _____ From DHW-1, Line 1e
- 11b. Total Adjusted Recovery Load:⁴ _____ (Line 1) × (Line 10b)
- 12b. Total Basic Energy Use: _____ From Table 6-8, or DHW-3
- 13b. Average Unit Basic Energy Use: _____ (Line 12b) ÷ (Line 1): enter on Line 2a, DHW-1
- 14b. Check average unit compliance on DHW-1.

Compliance

15. **Prescriptive Compliance** (for individual or shared heaters):
 DHW-1 Line 2d must be equal to or less than DHW-1 Line 3.
 See Section 6.1 and Chapter 3 in the *Residential Manual* for details.

¹ Total Gallons = (No. of Heaters) x (Gallons for each heater of this Heater Number)
² Total Energy Factor = (No. of Heaters) x (Energy Factor for each heater of this Heater Number)
³ Total Thermal Efficiency = (No. of Heaters) x (Thermal Efficiency for each heater of this Heater Number)
⁴ For a Large Storage Gas Heater proceed to DHW-3, no additional information need be entered on this sheet

Project Title _____

Date _____

Note: This sheet must also be submitted with a DHW-1 water heating worksheet, as well as a DHW-2B form with large storage gas heaters in multi-family buildings.

Indirect Gas Water Heaters

1. Storage tank Manufacturer/Model No. _____
2. Boiler and Instantaneous Heater Manufacturer/Model No. _____
3. Storage tank insulation R-value: Tank _____ External _____ Total = _____
4. Storage tank volume (gallons) _____
5. Boiler AFUE or Instantaneous Water Heater Thermal (Recovery) Efficiency EFF = _____
6. Adjusted Recovery Load (MBtu/yr, from Line 1e, DHW-1) ARL = _____
7. Jacket loss (MBtu/yr, from Table 6-8E) JL = _____
8. Pilot Energy (Btuh, from appliance database, or use 800) PE = _____
9. Basic Energy Use: $BEU = \frac{ARL + JL}{0.98 \times EFF} + (PE \times 0.00876)$ BEU = _____
(Enter BEU on DHW-1, Line 2a for single family or on DHW-2B, Line 12b for multi-family)

Large Storage Gas Heater¹ (> 75,000 Btuh input)

1. Water Heater Manufacturer _____
2. Water Heater Model No. _____
3. Storage Tank Volume (gallons) VOL = _____
4. Water Heater Thermal (Recovery) Efficiency (decimal fraction) EFF = _____
5. Adjusted Recovery Load (Mbtu/yr)
(From Line 1e, DHW-1 for single family or Line 11b, DHW-2B for multi-family) ARL = _____
6. Standby Loss % (from appliance database - e.g., "2.7") SBL% = _____
7. Basic Energy Use: $BEU = \frac{ARL}{EFF} + \frac{(5.461 \times SBL \times VOL)}{100}$ BEU = _____
(Enter BEU on DHW-1, Line 2a for single family or on DHW-2B, Line 12b for multi-family)

¹ The Domestic Hot Water Heating forms (DHW series) restrict the user to only one Large Storage Gas Heater per permitted space. In order to use more than one Large Storage Gas Heater the computer performance method must be used.

Project Title _____

Date _____

Storage Gas

- 1. Recovery Efficiency/AFUE _____ unitless From manufacturer’s literature or appliance database
- 2. Average Hourly Pipe Heat Loss _____ kBtu/hr From Pipe Heat Loss Worksheet below
- 3. Rated Input _____ kBtu/hr From manufacturer’s literature or appliance database
- 4. Effective AFUE _____ unitless Line 1 - (Line 2 ÷ Line 3)

Storage Electric

- 1. Average Hourly Pipe Heat Loss _____ kBtu/hr From Pipe Heat Loss Worksheet below
- 2. Rated Input _____ kW From manufacturer’s literature or appliance database
- 3. Pump Watts _____ watt From manufacturers literature
- 4. Term A _____ unitless 1 - [Line 1 ÷ (3.413 × Line 2)]
- 5. Term B _____ unitless 1 + [Line 3 ÷ (1000 × Line2)]
- 6. Effective HSPF (no fan) _____ Btu/watt 3.413 × (Line 4 ÷ Line 5)
- 7. Effective HSPF (with fan) _____ Btu/watt 1.017 ÷ [(1 ÷ Line 6) + 0.005]

Heat Pump

- 1. Energy Factor _____ unitless From manufacturer’s literature or appliance database
- 2. Average Hourly Pipe Heat Loss _____ kBtu/hr From Pipe Heat Loss Worksheet below
- 3. Rated Input _____ kW From manufacturer’s literature or appliance database
- 4. Recovery Efficiency _____ unitless 1 ÷ [(1 ÷ Line 1) - 0.1175]
- 5. Climate Zone Adjustment _____ unitless From table below
- 6. Effective HSPF (no fan) _____ Btu/watt 3.413 × [(Line 4 ÷ Line 5) - Line 2 ÷ (3.413 × Line 3)]
- 7. Effective HSPF (with fan) _____ Btu/watt 1.017 ÷ [(1 ÷ Line 6) + 0.005]

Climate Zone Adjustment

Climate Zone	Adjustment
1, 14	1.04
2, 3	0.99
4, 5, 12	1.07
6-11, 13, 15	0.92
16	1.50

Pipe Heat Loss Rate Table

Pipe Nominal Diameter (inches)	Insulation Thickness (inches)		
	0.5	0.75	1.0
0.50	71.6	60.9	54.2
0.75	91.1	75.8	66.6
1.00	109.9	90.1	78.8
1.50	146.7	117.5	100.3
2.00	182.9	144.3	121.7

Pipe Heat Loss Worksheet

(Complete this section when more than 10 feet of pipe is in unconditioned space.)

1. Description of Pipe Size and Insulation Condition	2. Pipe Heat Loss Rate (kBtu/yr•ft) ¹	3. Pipe Length (ft)	4. Total Pipe Heat Loss
_____	_____	×	= _____
_____	_____	×	= _____
_____	_____	×	= _____
_____	_____	×	= _____
_____	_____	×	= _____
		5. Sum	= _____

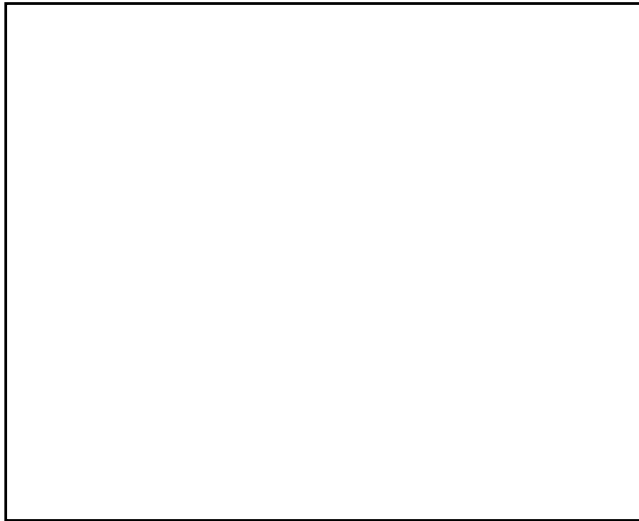
6. Average Hourly Pipe Heat Loss (kBtu/hr) = Sum ÷ 8760 = _____

¹ _____
 1. From Pipe Heat Loss Rate Table.¹

PROPOSED CONSTRUCTION ASSEMBLY: RESIDENTIAL FORM 3R

Project Title _____
 Project Address _____
 Documentation Author _____ Telephone _____
 Assembly Name _____

Date _____
 Building Permit # _____
 Plan Check / Date _____
 Field Check / Date _____
 Enforcement Agency Use Only



Sketch of Proposed Construction Assembly

Assembly Type: _____ Floor
 (check one) _____ Wall
 _____ Ceiling/Roof

Framing Material: _____

Framing Size: _____ × _____

Framing Spacing: _____ inches on center ('' o.c.)

Framing Percentage (Fr.%):
 (check one) Wall: _____ 15% (16'' o.c.)
 _____ 12% (24'' o.c.)
 _____ 9% (48'' o.c.)
 Floor/Ceiling: _____ 10% (16'' o.c.)
 _____ 7% (24'' o.c.)
 _____ 4% (48'' o.c.)

Wall Weight / sf: _____
 (Packages only)

List of Construction Components

	R-Value	
	Cavity (R _c)	Frame (R _f)
Outside Surface Air Film	_____	_____
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____
5. _____	_____	_____
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
Inside Surface Air Film	_____	_____
Total Unadjusted R-Values:	_____	_____
	R_c	R_f

Framing Adjustment Calculation:

$$\left[\left(\frac{\quad}{1 + R_c} \right) \times \left(\frac{\quad}{1 - (Fr.\% \div 100)} \right) \right] + \left[\left(\frac{\quad}{1 + R_f} \right) \times \left(\frac{\quad}{Fr.\% \div 100} \right) \right] = \text{Total U-Factor}$$

$$\frac{\quad}{1 \div \text{Total U-Factor}} = \text{Total R-Value}$$

Items 1 through 4 must be completed for glazing/shading combinations by using the Default Table for Fenestration Products (Table S-1) ; NFRC certified data, or Solar Heat Gain Coefficients Used for Exterior Shading Attachments (Table S-2) for the specific conditions indicated (#1a or #1b or #3). For instructions on filling out the worksheet, see *Shading* in the *RM Glossary, Appendix G*.

General Information

1a. For Fenestration Products w/NFRC testing and labels:

SHGC_{fen} = _____

OR

1b. For Fenestration Products without NFRC testing and labels (Table S-1): SHGC_{fen} = _____

1c. Frame Type	1d. Product Type	1e. Glazing Type	1f. Single/Double Pane
_____	_____	_____	_____
metal, non-metal, metal w/thermal break	operable/fixed	(visibly) tinted clear (not visibly tinted)	single pane/double pane

2. Skylight

(Y/N) _____

("Skylights" are glazing having a slope of less than 60 degrees from the horizontal with conditioned space below.)

Combined Exterior Shade with Fenestration

Exterior Shade Type: _____

3. SHGC_{Exterior Shade}: _____

(If no exterior shade, assume standard bug screens, SHGC_{Exterior Shade} = 0.76 for ordinary windows. This requirement does not apply to skylights where SHGC_{Exterior Shade} is assumed to be 1.00. If another exterior shade is substituted for bug screens, use one of the values from Table S-2

4.
$$\left[\left(\frac{\quad}{\text{SHGC}_{max}} \times 0.2875 \right) + 0.75 \right] \times \frac{\quad}{\text{SHGC}_{min}} =$$

Total SHGC

Where:

SHGC_{max} = Larger of (#1a or #1b) or #3

SHGC_{min} = Smaller of (#1a or #1b) or #3

Note: Calculated Solar Heat Gain Coefficient values for Total SHGC may be used directly for prescriptive packages.

Target Value for Total SHGC is 0.39 for Package Requirement of SHGC_{fen} = 0.40.

TABLES

Table S-1: DEFAULT FENESTRATION SOLAR HEAT GAIN COEFFICIENT

Frame Type	Product	Glazing	Total Window SHGC	
			Single Pane	Double Pane
Metal	Operable	Clear	0.80	0.70
Metal	Fixed	Clear	0.83	0.73
Metal	Operable	Tinted	0.67	0.59
Metal	Fixed	Tinted	0.68	0.60
Metal, Thermal Break	Operable	Clear	0.72	0.63
Metal, Thermal Break	Fixed	Clear	0.78	0.69
Metal, Thermal Break	Operable	Tinted	0.60	0.53
Metal, Thermal Break	Fixed	Tinted	0.65	0.57
Non-Metal	Operable	Clear	0.74	0.65
Non-Metal	Fixed	Clear	0.76	0.67
Non-Metal	Operable	Tinted	0.60	0.53
Non-Metal	Fixed	Tinted	0.63	0.55

SHGC = Solar Heat Gain Coefficient

TABLES (Continued)

Table S-2: Solar Heat Gain Coefficients Used for Exterior Shading Attachments for Form S and Computer Performance Methods^{1,2}

Exterior Shading Device ³	w/Single Pane Clear Glass & Metal Framing ⁴
1) Standard Bug Screens	0.76
2) Exterior Sunscreens with weave 53*16/inch	0.30
3) Louvered Sunscreens w/louvers as wide as openings	0.27
4) Low Sun Angle (LSA) Louvered Sunscreens	0.13
5) Roll-down Awning	0.13
6) Roll Down Blinds or Slats	0.13
7) None (for skylights only)	1.00

1. These values may be used on line 3 of the Solar Heat Gain Coefficient (SHGC) Worksheet (Form S) to calculate exterior shading with other glazing types and combined interior and exterior shading with glazing.
2. Exterior operable awnings (canvas, plastic or metal), except those that roll vertically down and cover the entire window, should be treated as overhangs for purposes of compliance with the Standards.
3. Standard bug screens must be assumed for all fenestration unless replaced by other exterior shading attachments. The solar heat gain coefficient listed for bug screens is an area-weighted value that assumes that the screens are only on operable windows. The solar heat gain coefficient of any other exterior shade screens applied only to some window areas must be area-weighted with the solar heat gain coefficient of standard bug screens for all other glazing (see Weighted Averaging in the Glossary). Different shading conditions may also be modeled explicitly in the computer performance method.
4. Reference glass for determining solar heat gain coefficients is 1/8 inch double strength (DSS) glass.

Project Title	Date
Project Address	Builder Name
Builder Contact	Telephone
HERS Rater	Telephone
Certifying Signature	Date
Firm: _____	Sample House Number
Street Address: _____	HERS Provider: _____
City/State/Zip: _____	Sample Group Number

Copies to: Builder, HERS Provider

HERS RATER COMPLIANCE STATEMENT

The house was: Tested Approved as part of sample testing, but was not tested

As the HERS rater providing diagnostic testing and field verification, I certify that the houses identified on this form comply with the diagnostic tested compliance requirements as checked on this form.

- The installer has provided a copy of CF-6R (Installation Certificate).
- Distribution system is fully ducted (i.e., does not use building cavities as plenums or platform returns in lieu of ducts)
- Where cloth backed, rubber adhesive duct tape is installed, mastic and drawbands are used in combination with cloth backed, rubber adhesive duct tape to seal leaks at duct connections.

MINIMUM REQUIREMENTS FOR DUCT LEAKAGE REDUCTION COMPLIANCE CREDIT

Duct Diagnostic Leakage Testing Results (Maximum 6% Duct Leakage)

Duct Pressurization Test Results (CFM @ 25 Pa)	Measured values	
Test Leakage Flow in CFM _____		
If fan flow is calculated as 400cfm/ton x number of tons enter calculated value here _____		
If fan flow is measured enter measured value here _____		
Leakage Percentage (100 x Test Leakage/Fan Flow) = _____		
Check Box for Pass or Fail (Pass=6% or less)	<input type="checkbox"/> Pass	<input type="checkbox"/> Fail

THERMOSTATIC EXPANSION VALVE (TXV)

<input type="checkbox"/> Yes <input type="checkbox"/> No Thermostatic Expansion Valve is installed and Access is provided for inspection	<input type="checkbox"/> Pass <input type="checkbox"/> Fail	
Yes is a pass		

MINIMUM REQUIREMENTS FOR DUCT DESIGN COMPLIANCE CREDIT

1. Yes No ACCA Manual D Design requirements have been met (rater has verified that actual installation matches values in CF-1R and design on plan).
 2. Yes No TXV is installed or Fan flow has been verified. If no TXV, verified fan flow matches design from CF-1R.
- Measured Fan Flow = _____
- Yes for both 1 and 2 is a Pass Pass Fail

Site Address

Permit Number

REFRIGERANT CHARGE AND AIRFLOW MEASUREMENT

Verification for Required Refrigerant Charge and Adequate Airflow for Split System Space Cooling Systems without Thermostatic Expansion Valves

Outdoor Unit Serial # _____
 Location _____
 Outdoor Unit Make _____
 Outdoor Unit Model _____
 Cooling Capacity _____ Btu/hr
 Date of Verification _____
 Date of Refrigerant Gauge Calibration _____ (must be checked monthly)
 Date of Thermocouple Calibration _____ (must be checked monthly)

Standard Charge and Airflow Measurement (outdoor air dry-bulb 55 °F and above):

Note: The system should be installed and charged in accordance with the manufacturer’s specifications and installer verification shall be documented on CF-6R before starting this procedure. If outdoor air dry-bulb is below 55 °F rater shall return to verify charge and airflow at a time when temperature is 55 °F or greater.

Yes No A copy of CF-6R (Installation Certificate) has been provided with refrigerant charge and airflow measurement documented.

Measured Temperatures

Supply (evaporator leaving) air dry-bulb temperature (Tsupply, db) _____ °F
 Return (evaporator entering) air dry-bulb temperature (Treturn, db) _____ °F
 Return (evaporator entering) air wet-bulb temperature (Treturn, wb) _____ °F
 Evaporator saturation temperature (Tevaporator, sat) _____ °F
 Suction line temperature (Tsuction, db) _____ °F
 Condenser (entering) air dry-bulb temperature (Tcondenser, db) _____ °F

Superheat Charge Method Calculations for Refrigerant Charge

Actual Superheat = Tsuction, db – Tevaporator, sat _____ °F
 Target Superheat (from Table 1) _____ °F
 Actual Superheat – Target Superheat _____ °F
 (System passes if between -5 and +5°F)

Temperature Split Method Calculations for Adequate Airflow

Actual Temperature Split = T return, db - Tsupply, db _____ °F
 Target Temperature Split (from Table 2) _____ °F
 Actual Temperature Split - Target Temperature Split _____ °F
 (System passes if between -3°F and +3°F or, upon remeasurement, if between -3°F and -25°F)

Standard Charge and Airflow Measurement Summary:

System shall pass both refrigerant charge and adequate airflow calculation criteria from the same measurements. If corrective actions were taken, both criteria must be remeasured and recalculated

System Passes _____ yes or _____ no

Table K-1: Target Superheat (Suction Line Temperature - Evaporator Saturation Temperature)

Condenser Air Dry-Bulb Temperature (°F) (T _{condenser, db})		Return Air Wet-Bulb Temperature (°F) (T _{return, wb})																										
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
		55	8.8	10.1	11.5	12.8	14.2	15.6	17.1	18.5	20.0	21.5	23.1	24.6	26.2	27.8	29.4	31.0	32.4	33.8	35.1	36.4	37.7	39.0	40.2	41.5	42.7	43.9
56	8.6	9.9	11.2	12.6	14.0	15.4	16.8	18.2	19.7	21.2	22.7	24.2	25.7	27.3	28.9	30.5	31.8	33.2	34.6	35.9	37.2	38.5	39.7	41.0	42.2	43.4	44.6	
57	8.3	9.6	11.0	12.3	13.7	15.1	16.5	17.9	19.4	20.8	22.3	23.8	25.3	26.8	28.3	29.9	31.3	32.6	34.0	35.3	36.7	38.0	39.2	40.5	41.7	43.0	44.2	
58	7.9	9.3	10.6	12.0	13.4	14.8	16.2	17.6	19.0	20.4	21.9	23.3	24.8	26.3	27.8	29.3	30.7	32.1	33.5	34.8	36.1	37.5	38.7	40.0	41.3	42.5	43.7	
59	7.5	8.9	10.2	11.6	13.0	14.4	15.8	17.2	18.6	20.0	21.4	22.9	24.3	25.7	27.2	28.7	30.1	31.5	32.9	34.3	35.6	36.9	38.3	39.5	40.8	42.1	43.3	
60	7.0	8.4	9.8	11.2	12.6	14.0	15.4	16.8	18.2	19.6	21.0	22.4	23.8	25.2	26.6	28.1	29.6	31.0	32.4	33.7	35.1	36.4	37.8	39.1	40.4	41.6	42.9	
61	6.5	7.9	9.3	10.7	12.1	13.5	14.9	16.3	17.7	19.1	20.5	21.9	23.3	24.7	26.1	27.5	29.0	30.4	31.8	33.2	34.6	35.9	37.3	38.6	39.9	41.2	42.4	
62	6.0	7.4	8.8	10.2	11.7	13.1	14.5	15.9	17.3	18.7	20.1	21.4	22.8	24.2	25.5	27.0	28.4	29.9	31.3	32.7	34.1	35.4	36.8	38.1	39.4	40.7	42.0	
63	5.3	6.8	8.3	9.7	11.1	12.6	14.0	15.4	16.8	18.2	19.6	20.9	22.3	23.6	25.0	26.4	27.8	29.3	30.7	32.2	33.6	34.9	36.3	37.7	39.0	40.3	41.6	
64	-	6.1	7.6	9.1	10.6	12.0	13.5	14.9	16.3	17.7	19.0	20.4	21.7	23.1	24.4	25.8	27.3	28.7	30.2	31.6	33.0	34.4	35.8	37.2	38.5	39.9	41.2	
65	-	5.4	7.0	8.5	10.0	11.5	12.9	14.3	15.8	17.1	18.5	19.9	21.2	22.5	23.8	25.2	26.7	28.2	29.7	31.1	32.5	33.9	35.3	36.7	38.1	39.4	40.8	
66	-	-	6.3	7.8	9.3	10.8	12.3	13.8	15.2	16.6	18.0	19.3	20.7	22.0	23.2	24.6	26.1	27.6	29.1	30.6	32.0	33.4	34.9	36.3	37.6	39.0	40.4	
67	-	-	5.5	7.1	8.7	10.2	11.7	13.2	14.6	16.0	17.4	18.8	20.1	21.4	22.7	24.1	25.6	27.1	28.6	30.1	31.5	33.0	34.4	35.8	37.2	38.6	39.9	
68	-	-	-	6.3	8.0	9.5	11.1	12.6	14.0	15.5	16.8	18.2	19.5	20.8	22.1	23.5	25.0	26.5	28.0	29.5	31.0	32.5	33.9	35.3	36.8	38.1	39.5	
69	-	-	-	5.5	7.2	8.8	10.4	11.9	13.4	14.8	16.3	17.6	19.0	20.3	21.5	22.9	24.4	26.0	27.5	29.0	30.5	32.0	33.4	34.9	36.3	37.7	39.1	
70	-	-	-	-	6.4	8.1	9.7	11.2	12.7	14.2	15.7	17.0	18.4	19.7	20.9	22.3	23.9	25.4	27.0	28.5	30.0	31.5	33.0	34.4	35.9	37.3	38.7	
71	-	-	-	-	5.6	7.3	8.9	10.5	12.1	13.6	15.0	16.4	17.8	19.1	20.3	21.7	23.3	24.9	26.4	28.0	29.5	31.0	32.5	34.0	35.4	36.9	38.3	
72	-	-	-	-	-	6.4	8.1	9.8	11.4	12.9	14.4	15.8	17.2	18.5	19.7	21.2	22.8	24.3	25.9	27.4	29.0	30.5	32.0	33.5	35.0	36.5	37.9	
73	-	-	-	-	-	5.6	7.3	9.0	10.7	12.2	13.7	15.2	16.6	17.9	19.2	20.6	22.2	23.8	25.4	26.9	28.5	30.0	31.5	33.1	34.6	36.0	37.5	
74	-	-	-	-	-	-	6.5	8.2	9.9	11.5	13.1	14.5	15.9	17.3	18.6	20.0	21.6	23.2	24.8	26.4	28.0	29.5	31.1	32.6	34.1	35.6	37.1	
75	-	-	-	-	-	-	5.6	7.4	9.2	10.8	12.4	13.9	15.3	16.7	18.0	19.4	21.1	22.7	24.3	25.9	27.5	29.1	30.6	32.2	33.7	35.2	36.7	
76	-	-	-	-	-	-	-	6.6	8.4	10.1	11.7	13.2	14.7	16.1	17.4	18.9	20.5	22.1	23.8	25.4	27.0	28.6	30.1	31.7	33.3	34.8	36.3	
77	-	-	-	-	-	-	-	5.7	7.5	9.3	11.0	12.5	14.0	15.4	16.8	18.3	20.0	21.6	23.2	24.9	26.5	28.1	29.7	31.3	32.8	34.4	36.0	
78	-	-	-	-	-	-	-	-	6.7	8.5	10.2	11.8	13.4	14.8	16.2	17.7	19.4	21.1	22.7	24.4	26.0	27.6	29.2	30.8	32.4	34.0	35.6	
79	-	-	-	-	-	-	-	-	5.9	7.7	9.5	11.1	12.7	14.2	15.6	17.1	18.8	20.5	22.2	23.8	25.5	27.1	28.8	30.4	32.0	33.6	35.2	
80	-	-	-	-	-	-	-	-	-	6.9	8.7	10.4	12.0	13.5	15.0	16.6	18.3	20.0	21.7	23.3	25.0	26.7	28.3	29.9	31.6	33.2	34.8	
81	-	-	-	-	-	-	-	-	-	6.0	7.9	9.7	11.3	12.9	14.3	16.0	17.7	19.4	21.1	22.8	24.5	26.2	27.9	29.5	31.2	32.8	34.4	
82	-	-	-	-	-	-	-	-	-	5.2	7.1	8.9	10.6	12.2	13.7	15.4	17.2	18.9	20.6	22.3	24.0	25.7	27.4	29.1	30.7	32.4	34.0	
83	-	-	-	-	-	-	-	-	-	-	6.3	8.2	9.9	11.6	13.1	14.9	16.6	18.4	20.1	21.8	23.5	25.2	26.9	28.6	30.3	32.0	33.7	
84	-	-	-	-	-	-	-	-	-	5.5	7.4	9.2	10.9	12.5	14.3	16.1	17.8	19.6	21.3	23.0	24.8	26.5	28.2	29.9	31.6	33.3	35.0	
85	-	-	-	-	-	-	-	-	-	-	6.6	8.5	10.3	11.9	13.7	15.5	17.3	19.0	20.8	22.6	24.3	26.0	27.8	29.5	31.2	32.9	34.6	
86	-	-	-	-	-	-	-	-	-	-	5.8	7.8	9.6	11.3	13.2	15.0	16.7	18.5	20.3	22.1	23.8	25.6	27.3	29.1	30.8	32.6	34.4	
87	-	-	-	-	-	-	-	-	-	-	5.0	7.0	8.9	10.6	12.6	14.4	16.2	18.0	19.8	21.6	23.4	25.1	26.9	28.7	30.4	32.2	34.0	
88	-	-	-	-	-	-	-	-	-	-	-	6.3	8.2	10.0	12.0	13.9	15.7	17.5	19.3	21.1	22.9	24.7	26.5	28.3	30.1	31.8	33.6	
89	-	-	-	-	-	-	-	-	-	-	5.5	7.5	9.4	11.5	13.3	15.1	17.0	18.8	20.6	22.4	24.3	26.1	27.9	29.7	31.5	33.3	35.1	
90	-	-	-	-	-	-	-	-	-	-	-	6.8	8.8	10.9	12.8	14.6	16.5	18.3	20.1	22.0	23.8	25.6	27.5	29.3	31.1	32.9	34.7	

Site Address

Permit Number

Table K-1: Target Superheat (Suction Line Temperature - Evaporator Saturation Temperature) (continued)

		Return Air Wet-Bulb Temperature (°F)																										
		(T _{return,wb})																										
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Condenser Air Dry-Bulb Temperature (°F) (T _{condenser,db})	91	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	8.1	10.3	12.2	14.1	15.9	17.8	19.7	21.5	23.4	25.2	27.1	28.9	30.8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	7.5	9.8	11.7	13.5	15.4	17.3	19.2	21.1	22.9	24.8	26.7	28.5	30.4
	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	9.2	11.1	13.0	14.9	16.8	18.7	20.6	22.5	24.4	26.3	28.2	30.1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.7	10.6	12.5	14.4	16.3	18.2	20.2	22.1	24.0	25.9	27.8	29.7
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	8.1	10.0	12.0	13.9	15.8	17.8	19.7	21.6	23.6	25.5	27.4	29.4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5	9.5	11.4	13.4	15.3	17.3	19.2	21.2	23.2	25.1	27.1	29.0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.0	8.9	10.9	12.9	14.9	16.8	18.8	20.8	22.7	24.7	26.7	28.7
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	8.4	10.4	12.4	14.4	16.4	18.3	20.3	22.3	24.3	26.3	28.3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.8	7.9	9.9	11.9	13.9	15.9	17.9	19.9	21.9	24.0	26.0	28.0
	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.3	7.3	9.3	11.4	13.4	15.4	17.5	19.5	21.5	23.6	25.6	27.7
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	8.8	10.9	12.9	15.0	17.0	19.1	21.1	23.2	25.3	27.3
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.3	10.4	12.4	14.5	16.6	18.6	20.7	22.8	24.9	27.0
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	7.8	9.9	11.9	14.0	16.1	18.2	20.3	22.4	24.5	26.7	
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	7.2	9.3	11.5	13.6	15.7	17.8	19.9	22.1	24.2	26.3	
	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	8.8	11.0	13.1	15.2	17.4	19.5	21.7	23.8	26.0	
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.3	10.5	12.6	14.8	17.0	19.1	21.3	23.5	25.7	
	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	7.9	10.0	12.2	14.4	16.6	18.7	21.0	23.2	25.4		
	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	7.4	9.5	11.7	13.9	16.1	18.4	20.6	22.8	25.1		
	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.9	9.1	11.3	13.5	15.7	18.0	20.2	22.5	24.7		
	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	8.6	10.8	13.1	15.3	17.6	19.9	22.1	24.4			
111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	8.1	10.4	12.6	14.9	17.2	19.5	21.8	24.1				
112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	7.6	9.9	12.2	14.5	16.8	19.1	21.5	23.8				
113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	9.5	11.8	14.1	16.4	18.8	21.1	23.5				
114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	9.0	11.4	13.7	16.1	18.4	20.8	23.2				
115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.6	10.9	13.3	15.7	18.1	20.5	22.9				

Site Address

Permit Number

Table K-2: Target Temperature Split (Return Dry-Bulb – Supply Dry-Bulb)

		Return Air Wet-Bulb (°F) ($T_{\text{return, wb}}$)																											
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	
Return Air Dry-Bulb (°F) ($T_{\text{return, db}}$)	70	20.9	20.7	20.6	20.4	20.1	19.9	19.5	19.1	18.7	18.2	17.7	17.2	16.5	15.9	15.2	14.4	13.7	12.8	11.9	11.0	10.0	9.0	7.9	6.8	5.7	4.5	3.2	
	71	21.4	21.3	21.1	20.9	20.7	20.4	20.1	19.7	19.3	18.8	18.3	17.7	17.1	16.4	15.7	15.0	14.2	13.4	12.5	11.5	10.6	9.5	8.5	7.4	6.2	5.0	3.8	
	72	21.9	21.8	21.7	21.5	21.2	20.9	20.6	20.2	19.8	19.3	18.8	18.2	17.6	17.0	16.3	15.5	14.7	13.9	13.0	12.1	11.1	10.1	9.0	7.9	6.8	5.6	4.3	
	73	22.5	22.4	22.2	22.0	21.8	21.5	21.2	20.8	20.3	19.9	19.4	18.8	18.2	17.5	16.8	16.1	15.3	14.4	13.6	12.6	11.7	10.6	9.6	8.5	7.3	6.1	4.8	
	74	23.0	22.9	22.8	22.6	22.3	22.0	21.7	21.3	20.9	20.4	19.9	19.3	18.7	18.1	17.4	16.6	15.8	15.0	14.1	13.2	12.2	11.2	10.1	9.0	7.8	6.6	5.4	
	75	23.6	23.5	23.3	23.1	22.9	22.6	22.2	21.9	21.4	21.0	20.4	19.9	19.3	18.6	17.9	17.2	16.4	15.5	14.7	13.7	12.7	11.7	10.7	9.5	8.4	7.2	5.9	
	76	24.1	24.0	23.9	23.7	23.4	23.1	22.8	22.4	22.0	21.5	21.0	20.4	19.8	19.2	18.5	17.7	16.9	16.1	15.2	14.3	13.3	12.3	11.2	10.1	8.9	7.7	6.5	
	77	-	24.6	24.4	24.2	24.0	23.7	23.3	22.9	22.5	22.0	21.5	21.0	20.4	19.7	19.0	18.3	17.5	16.6	15.7	14.8	13.8	12.8	11.7	10.6	9.5	8.3	7.0	
	78	-	-	-	24.7	24.5	24.2	23.9	23.5	23.1	22.6	22.1	21.5	20.9	20.2	19.5	18.8	18.0	17.2	16.3	15.4	14.4	13.4	12.3	11.2	10.0	8.8	7.6	
	79	-	-	-	-	-	24.8	24.4	24.0	23.6	23.1	22.6	22.1	21.4	20.8	20.1	19.3	18.5	17.7	16.8	15.9	14.9	13.9	12.8	11.7	10.6	9.4	8.1	
	80	-	-	-	-	-	-	25.0	24.6	24.2	23.7	23.2	22.6	22.0	21.3	20.6	19.9	19.1	18.3	17.4	16.4	15.5	14.4	13.4	12.3	11.1	9.9	8.7	
	81	-	-	-	-	-	-	-	25.1	24.7	24.2	23.7	23.1	22.5	21.9	21.2	20.4	19.6	18.8	17.9	17.0	16.0	15.0	13.9	12.8	11.7	10.4	9.2	
	82	-	-	-	-	-	-	-	-	25.2	24.8	24.2	23.7	23.1	22.4	21.7	21.0	20.2	19.3	18.5	17.5	16.6	15.5	14.5	13.4	12.2	11.0	9.7	
	83	-	-	-	-	-	-	-	-	-	25.3	24.8	24.2	23.6	23.0	22.3	21.5	20.7	19.9	19.0	18.1	17.1	16.1	15.0	13.9	12.7	11.5	10.3	
	84	-	-	-	-	-	-	-	-	-	-	25.9	25.3	24.8	24.2	23.5	22.8	22.1	21.3	20.4	19.5	18.6	17.6	16.6	15.6	14.4	13.3	12.1	10.8

Project Title _____ Plan Number _____ Date _____
Sample Group Number _____ Sample House Number _____

MINIMUM REQUIREMENTS FOR DUCT IN CONDITIONED SPACE COMPLIANCE CREDIT

Field Verification Results

Yes No Duct in conditioned space criteria matches CF-1R

Yes is a Pass Pass Fail

MINIMUM REQUIREMENTS FOR REDUCED DUCT SURFACE AREA COMPLIANCE CREDIT

Measured duct exterior surface area in the following unconditioned duct locations (square feet):

Attics

Crawlspaces

Basements

Other (e.g., garages, etc.)

Yes No Duct surface area matches CF-1R?

Yes is a Pass Pass Fail

Project Title _____ Plan Number _____

Date _____

Sample Group Number _____

Sample House Number _____

MINIMUM REQUIREMENTS FOR INFILTRATION REDUCTION COMPLIANCE CREDIT

Diagnostic Testing Results

Building Envelope Leakage (CFM @ 50 Pa) as measured by Rater

- 1. Yes No Is measured envelope leakage less than or equal to the required level from CF-1R? _____
- 2. Yes No Is Mechanical Ventilation shown as required on the CF-1R?
- 2a. Yes No If Mechanical Ventilation is required on the CF-1R (Yes in line 2), has it been installed?
- 2b. Yes No Check this box yes if mechanical ventilation is required (Yes in line 2) and ventilation fan watts are no greater than shown on CF-1R.
- 3. Yes No Check this box yes if measured building infiltration (CFM @ 50 Pa) is greater than the CFM @ 50 values shown for an SLA of 1.5 on CF-1R (If this box is checked no, mechanical ventilation is required.)
- 4. Yes No Check this box yes if measured building infiltration (CFM @ 50 Pa) is less than the CFM @ 50 values shown for an SLA of 1.5 on CF-1R, mechanical ventilation is installed and house pressure is greater than minus 5 Pascal with all exhaust fans operating.

Pass if:

- a. Yes in line 1 and line 3, or
- b. Yes in line 1 and line2, 2a, and 2b, or
- c. Yes in line 1 and Yes in line 4.

Otherwise fail.

Pass Fail

Site Address

Permit Number

An installation certificate is required to be posted at the building site or made available for all appropriate inspections. (The information provided on this form is required; however, use of this form to provide the information is optional.) After completion of final inspection, a copy must be provided to the building department (upon request) and the building owner at occupancy, per Section 10-103(b).

HVAC SYSTEMS:

Heating Equipment

Table with 8 columns: Equip. Type (pkg. heat pump), CEC Certified Mfr Name and Model Number, # of Identical Systems, Efficiency (AFUE, etc.)1, Duct Location (attic, etc.), Duct or Piping R-value, Heating Load (Btu/hr), Heating Capacity (Btu/hr)

Cooling Equipment

Table with 8 columns: Equip. Type (pkg. heat pump), CEC Certified Compressor Unit Mfr Name and Model Number, # of Identical Systems, Efficiency (SEER, etc.)1, Duct Location (attic, etc.), Duct R-value, Cooling Load (Btu/hr), Cooling Capacity (Btu/hr)

1. ≥ reads greater than or equal to.

I, the undersigned, verify that equipment listed above is: 1) is the actual equipment installed, 2) equivalent to or more efficient than that specified in the certificate of compliance (Form CF-1R) submitted for compliance with the Energy Efficiency Standards for residential buildings, and 3) equipment that meets or exceeds the appropriate requirements for manufactured devices (from the Appliance Efficiency Regulations or Part 6), where applicable.

Signature, Date

Installing Subcontractor (Co. Name) OR General Contractor (Co. Name) OR Owner

WATER HEATING SYSTEMS:

Table with 10 columns: Heater Type, CEC Certified Mfr Name & Model Number, Distribution Type (Std, Point-of-Use), If Recirculation, Control Type, # of Identical Systems, Rated2 Input (kW or Btu/hr), Tank Volume (gallons), Efficiency2 (EF, RE), Standby2 Loss (%), External Insulation R-value3

- 2. For small gas storage (rated input of less than or equal to 75,000 Btu/hr), electric resistance and heat pump water heaters, list Energy Factor. For large gas storage water heaters (rated input of greater than 75,000 Btu/hr), list Recovery Efficiency, Standby Loss and Rated Input. For instantaneous gas water heaters, list Recovery Efficiency and Rated Input.
3. R-12 external insulation is mandatory for storage water heaters with an energy factor of less than 0.58.

Faucets & Shower Heads:

All faucets and showerheads installed are certified to the Commission, pursuant to Title 24, Part 6, Section 111.

I, the undersigned, verify that equipment listed above my signature is: 1) the actual equipment installed; 2) equivalent to or more efficient than that specified in the certificate of compliance (Form CF-1R) submitted for compliance with the Energy Efficiency Standards for residential buildings; and 3) equipment that meets or exceeds the appropriate requirements for manufactured devices (from the Appliance Efficiency Regulations or Part 6), where applicable.

Signature, Date

Installing Subcontractor (Co. Name) OR General Contractor (Co. Name) OR Owner

COPY TO: Building Department
HERS Provider (if applicable)
Building Owner at Occupancy

Site Address

Permit Number

FENESTRATION/GLAZING:

Table with 8 columns: Manufacturer/Brand Name, Product U-Factor, Product SHGC, # of Panes, Total Quantity of Like Product, Square Feet, Exterior Shading Device or Overhang, Comments/Location/Special Features. Includes 15 numbered rows for data entry.

1 Manufactured fenestration products use the values from the product label. Field fabricated fenestration products use the default values from Section 116 of the Energy Efficiency Standards.

2 Installed U-Factor must be less than or equal to values from CF-1R. Installed SHGC must be less than or equal to values from CF-1R, or a shading device (exterior or overhang) is installed as specified on the CF-1R. Alternatively, installed weighted average U-Factors for the total fenestration area are less than or equal to values from CF-1R.

I, the undersigned, verify that the fenestration/glazing listed above my signature: 1) is the actual fenestration product installed; 2) is equivalent to or has a lower U-Factor and lower SHGC than that specified in the certificate of compliance (Form CF-1R) submitted for compliance with the Energy Efficiency Standards for residential buildings; and 3) the product meets or exceeds the appropriate requirements for manufactured devices (from Part 6), where applicable.

Three signature lines for contractors, each with fields for 'Item #s (if applicable)', 'Signature, Date', and 'Installing Subcontractor (Co. Name) OR General Contractor (Co. Name) OR Owner OR Window Distributor'.

COPY TO: Building Department
HERS Provider (if applicable)
Building Owner at Occupancy

Site Address

Permit Number

DUCT LEAKAGE AND DESIGN DIAGNOSTICS

DUCT LEAKAGE REDUCTION

Pressurization Test Results (CFM @ 25 PA)

Test Leakage (CFM) _____

Fan Flow

If Fan Flow is Calculated as 400 cfm/ton x number of tons, or as 21.7 x Heating Capacity in Thousands of Btu/hr, enter calculated value here _____

If fan flow is measured, enter measured value here _____

Leakage Fraction = Test Leakage/(Measured or Calculated Fan Flow) = _____

Pass if leakage fraction ≤ 0.06

Pass Fail

For AEROSOL TYPE SEALANTS ONLY - The following diagnostic testing was completed:

Duct Fan Pressurization at rough-in measured leakage (CFM)

CHECK AFTER FINISHING WALL:

Yes No Pressure pan test or House pressurization test

Yes No Visual Inspection of Duct Connections

Pass Fail

THERMOSTATIC EXPANSION VALVE (TXV)

Yes No Thermostatic Expansion Valve is installed and Access is provided for inspection

Yes is a pass

Pass Fail

DUCT DESIGN

1. Yes No ACCA Manual D Design calculations have been completed, Duct Design is on the plans and duct installation matches plans.

2. Yes No TXV is installed or Fan flow has been verified. If no TXV, verified fan flow matches design from CF-1R.

Measured Fan Flow = _____

Yes for both 1 and 2 is a Pass

Pass Fail

I, the undersigned, verify that the above diagnostic test results and the work I performed associated with the test(s) is in conformance with the requirements for compliance credit. [The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or sub-contractors certifying that diagnostic testing and installation meet the requirements for compliance credit.]

Tests

Performed

COPY TO:

Building Department
HERS Provider (if applicable)
Building Owner at Occupancy

Signature, Date

Installing Subcontractor (Co. Name) OR
General Contractor (Co. Name)

Site Address

Permit Number

REFRIGERANT CHARGE AND AIRFLOW MEASUREMENT

Verification for Required Refrigerant Charge and Adequate Airflow for Split System Space Cooling Systems without Thermostatic Expansion Valves

Outdoor Unit Serial # _____
Outdoor Unit Make _____
Outdoor Unit Model _____
Cooling Capacity _____ Btu/hr
Date of Verification _____
Date of Refrigerant Gauge Calibration _____ (must be checked monthly)
Date of Thermocouple Calibration _____ (must be checked monthly)

Standard Charge and Airflow Measurement (outdoor air dry-bulb 55 °F and above):

Note: The system should be installed and charged in accordance with the manufacturer’s specifications before starting this procedure.

Measured Temperatures

Supply (evaporator leaving) air dry-bulb temperature (Tsupply, db) _____ °F
Return (evaporator entering) air dry-bulb temperature (Treturn, db) _____ °F
Return (evaporator entering) air wet-bulb temperature (Treturn, wb) _____ °F
Evaporator saturation temperature (Tevaporator, sat) _____ °F
Suction line temperature (Tsuction, db) _____ °F
Condenser (entering) air dry-bulb temperature (Tcondenser, db) _____ °F

Superheat Charge Method Calculations for Refrigerant Charge

Actual Superheat = Tsuction, db – Tevaporator, sat _____ °F
Target Superheat (from Table 1) _____ °F
Actual Superheat – Target Superheat _____ °F
(System passes if between -5 and +5°F)

Temperature Split Method Calculations for Adequate Airflow

Actual Temperature Split = T return, db - Tsupply, db _____ °F
Target Temperature Split (from Table 2) _____ °F
Actual Temperature Split - Target Temperature Split _____ °F
(System passes if between -3°F and +3°F or, upon remeasurement, if between +3°F and -25°F)

Standard Charge and Airflow Measurement Summary:

System shall pass both refrigerant charge and adequate airflow calculation criteria from the same measurements. If corrective actions were taken, both criteria must be remeasured and recalculated

System Passes _____ yes or _____ no

Site Address

Permit Number

Alternate Charge and Airflow Measurement (outdoor air dry-bulb below 55 °F):

Weigh-In Charging Method for Refrigerant Charge

Actual liquid line length: _____ ft.

Manufacturers Standard liquid line length: _____ ft.

Difference (Actual – Standard): _____ ft.

Manufacturers correction (ounces per foot) _____ x difference in length = _____ ounces
(+ = add) (- = remove)

Measured Airflow Method for Adequate Airflow

Airflow criterion: Cooling Capacity _____ X 0.032 = _____ CFM

Measured Airflow is _____ CFM and passes since it is greater than the criterion.

Alternate Charge and Airflow Measurement Summary:

System charge shall be corrected and it shall also pass measured adequate airflow criterion.

System Passes _____ yes or _____ no

Site Address

Permit Number

Table K-1: Target Superheat (Suction Line Temperature - Evaporator Saturation Temperature)

		Return Air Wet-Bulb Temperature (°F)																										
		$(T_{return,wb})$																										
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Condenser Air Dry-Bulb Temperature (°F) $(T_{condenser,db})$	55	8.8	10.1	11.5	12.8	14.2	15.6	17.1	18.5	20.0	21.5	23.1	24.6	26.2	27.8	29.4	31.0	32.4	33.8	35.1	36.4	37.7	39.0	40.2	41.5	42.7	43.9	45.0
	56	8.6	9.9	11.2	12.6	14.0	15.4	16.8	18.2	19.7	21.2	22.7	24.2	25.7	27.3	28.9	30.5	31.8	33.2	34.6	35.9	37.2	38.5	39.7	41.0	42.2	43.4	44.6
	57	8.3	9.6	11.0	12.3	13.7	15.1	16.5	17.9	19.4	20.8	22.3	23.8	25.3	26.8	28.3	29.9	31.3	32.6	34.0	35.3	36.7	38.0	39.2	40.5	41.7	43.0	44.2
	58	7.9	9.3	10.6	12.0	13.4	14.8	16.2	17.6	19.0	20.4	21.9	23.3	24.8	26.3	27.8	29.3	30.7	32.1	33.5	34.8	36.1	37.5	38.7	40.0	41.3	42.5	43.7
	59	7.5	8.9	10.2	11.6	13.0	14.4	15.8	17.2	18.6	20.0	21.4	22.9	24.3	25.7	27.2	28.7	30.1	31.5	32.9	34.3	35.6	36.9	38.3	39.5	40.8	42.1	43.3
	60	7.0	8.4	9.8	11.2	12.6	14.0	15.4	16.8	18.2	19.6	21.0	22.4	23.8	25.2	26.6	28.1	29.6	31.0	32.4	33.7	35.1	36.4	37.8	39.1	40.4	41.6	42.9
	61	6.5	7.9	9.3	10.7	12.1	13.5	14.9	16.3	17.7	19.1	20.5	21.9	23.3	24.7	26.1	27.5	29.0	30.4	31.8	33.2	34.6	35.9	37.3	38.6	39.9	41.2	42.4
	62	6.0	7.4	8.8	10.2	11.7	13.1	14.5	15.9	17.3	18.7	20.1	21.4	22.8	24.2	25.5	27.0	28.4	29.9	31.3	32.7	34.1	35.4	36.8	38.1	39.4	40.7	42.0
	63	5.3	6.8	8.3	9.7	11.1	12.6	14.0	15.4	16.8	18.2	19.6	20.9	22.3	23.6	25.0	26.4	27.8	29.3	30.7	32.2	33.6	34.9	36.3	37.7	39.0	40.3	41.6
	64	-	6.1	7.6	9.1	10.6	12.0	13.5	14.9	16.3	17.7	19.0	20.4	21.7	23.1	24.4	25.8	27.3	28.7	30.2	31.6	33.0	34.4	35.8	37.2	38.5	39.9	41.2
	65	-	5.4	7.0	8.5	10.0	11.5	12.9	14.3	15.8	17.1	18.5	19.9	21.2	22.5	23.8	25.2	26.7	28.2	29.7	31.1	32.5	33.9	35.3	36.7	38.1	39.4	40.8
	66	-	-	6.3	7.8	9.3	10.8	12.3	13.8	15.2	16.6	18.0	19.3	20.7	22.0	23.2	24.6	26.1	27.6	29.1	30.6	32.0	33.4	34.9	36.3	37.6	39.0	40.4
	67	-	-	5.5	7.1	8.7	10.2	11.7	13.2	14.6	16.0	17.4	18.8	20.1	21.4	22.7	24.1	25.6	27.1	28.6	30.1	31.5	33.0	34.4	35.8	37.2	38.6	39.9
	68	-	-	-	6.3	8.0	9.5	11.1	12.6	14.0	15.5	16.8	18.2	19.5	20.8	22.1	23.5	25.0	26.5	28.0	29.5	31.0	32.5	33.9	35.3	36.8	38.1	39.5
	69	-	-	-	5.5	7.2	8.8	10.4	11.9	13.4	14.8	16.3	17.6	19.0	20.3	21.5	22.9	24.4	26.0	27.5	29.0	30.5	32.0	33.4	34.9	36.3	37.7	39.1
	70	-	-	-	-	6.4	8.1	9.7	11.2	12.7	14.2	15.7	17.0	18.4	19.7	20.9	22.3	23.9	25.4	27.0	28.5	30.0	31.5	33.0	34.4	35.9	37.3	38.7
	71	-	-	-	-	5.6	7.3	8.9	10.5	12.1	13.6	15.0	16.4	17.8	19.1	20.3	21.7	23.3	24.9	26.4	28.0	29.5	31.0	32.5	34.0	35.4	36.9	38.3
	72	-	-	-	-	-	6.4	8.1	9.8	11.4	12.9	14.4	15.8	17.2	18.5	19.7	21.2	22.8	24.3	25.9	27.4	29.0	30.5	32.0	33.5	35.0	36.5	37.9
	73	-	-	-	-	-	5.6	7.3	9.0	10.7	12.2	13.7	15.2	16.6	17.9	19.2	20.6	22.2	23.8	25.4	26.9	28.5	30.0	31.5	33.1	34.6	36.0	37.5
	74	-	-	-	-	-	-	6.5	8.2	9.9	11.5	13.1	14.5	15.9	17.3	18.6	20.0	21.6	23.2	24.8	26.4	28.0	29.5	31.1	32.6	34.1	35.6	37.1
	75	-	-	-	-	-	-	5.6	7.4	9.2	10.8	12.4	13.9	15.3	16.7	18.0	19.4	21.1	22.7	24.3	25.9	27.5	29.1	30.6	32.2	33.7	35.2	36.7
	76	-	-	-	-	-	-	-	6.6	8.4	10.1	11.7	13.2	14.7	16.1	17.4	18.9	20.5	22.1	23.8	25.4	27.0	28.6	30.1	31.7	33.3	34.8	36.3
	77	-	-	-	-	-	-	-	5.7	7.5	9.3	11.0	12.5	14.0	15.4	16.8	18.3	20.0	21.6	23.2	24.9	26.5	28.1	29.7	31.3	32.8	34.4	36.0
	78	-	-	-	-	-	-	-	-	6.7	8.5	10.2	11.8	13.4	14.8	16.2	17.7	19.4	21.1	22.7	24.4	26.0	27.6	29.2	30.8	32.4	34.0	35.6
	79	-	-	-	-	-	-	-	-	5.9	7.7	9.5	11.1	12.7	14.2	15.6	17.1	18.8	20.5	22.2	23.8	25.5	27.1	28.8	30.4	32.0	33.6	35.2
80	-	-	-	-	-	-	-	-	-	6.9	8.7	10.4	12.0	13.5	15.0	16.6	18.3	20.0	21.7	23.3	25.0	26.7	28.3	29.9	31.6	33.2	34.8	
81	-	-	-	-	-	-	-	-	-	6.0	7.9	9.7	11.3	12.9	14.3	16.0	17.7	19.4	21.1	22.8	24.5	26.2	27.9	29.5	31.2	32.8	34.4	
82	-	-	-	-	-	-	-	-	-	5.2	7.1	8.9	10.6	12.2	13.7	15.4	17.2	18.9	20.6	22.3	24.0	25.7	27.4	29.1	30.7	32.4	34.0	
83	-	-	-	-	-	-	-	-	-	-	6.3	8.2	9.9	11.6	13.1	14.9	16.6	18.4	20.1	21.8	23.5	25.2	26.9	28.6	30.3	32.0	33.7	
84	-	-	-	-	-	-	-	-	-	5.5	7.4	9.2	10.9	12.5	14.3	16.1	17.8	19.6	21.3	23.0	24.8	26.5	28.2	29.9	31.6	33.3		
85	-	-	-	-	-	-	-	-	-	-	6.6	8.5	10.3	11.9	13.7	15.5	17.3	19.0	20.8	22.6	24.3	26.0	27.8	29.5	31.2	32.9		
86	-	-	-	-	-	-	-	-	-	-	5.8	7.8	9.6	11.3	13.2	15.0	16.7	18.5	20.3	22.1	23.8	25.6	27.3	29.1	30.8	32.6		
87	-	-	-	-	-	-	-	-	-	5.0	7.0	8.9	10.6	12.6	14.4	16.2	18.0	19.8	21.6	23.4	25.1	26.9	28.7	30.4	32.2			
88	-	-	-	-	-	-	-	-	-	-	6.3	8.2	10.0	12.0	13.9	15.7	17.5	19.3	21.1	22.9	24.7	26.5	28.3	30.1	31.8			
89	-	-	-	-	-	-	-	-	-	-	5.5	7.5	9.4	11.5	13.3	15.1	17.0	18.8	20.6	22.4	24.3	26.1	27.9	29.7	31.5			
90	-	-	-	-	-	-	-	-	-	-	6.8	8.8	10.9	12.8	14.6	16.5	18.3	20.1	22.0	23.8	25.6	27.5	29.3	31.1				

Site Address

Permit Number

Table K-1: Target Superheat (Suction Line Temperature - Evaporator Saturation Temperature) (continued)

		Return Air Wet-Bulb Temperature (°F)																										
		$(T_{\text{return, wb}})$																										
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Condenser Air Dry-Bulb Temperature (°F) $(T_{\text{condenser, db}})$	91	-	-	-	-	-	-	-	-	-	-	-	-	-	6.1	8.1	10.3	12.2	14.1	15.9	17.8	19.7	21.5	23.4	25.2	27.1	28.9	30.8
	92	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	7.5	9.8	11.7	13.5	15.4	17.3	19.2	21.1	22.9	24.8	26.7	28.5	30.4
	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	9.2	11.1	13.0	14.9	16.8	18.7	20.6	22.5	24.4	26.3	28.2	30.1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.7	10.6	12.5	14.4	16.3	18.2	20.2	22.1	24.0	25.9	27.8	29.7
	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.6	8.1	10.0	12.0	13.9	15.8	17.8	19.7	21.6	23.6	25.5	27.4	29.4
	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.5	9.5	11.4	13.4	15.3	17.3	19.2	21.2	23.2	25.1	27.1	29.0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.0	8.9	10.9	12.9	14.9	16.8	18.8	20.8	22.7	24.7	26.7	28.7
	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	8.4	10.4	12.4	14.4	16.4	18.3	20.3	22.3	24.3	26.3	28.3
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.8	7.9	9.9	11.9	13.9	15.9	17.9	19.9	21.9	24.0	26.0	28.0
	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.3	7.3	9.3	11.4	13.4	15.4	17.5	19.5	21.5	23.6	25.6	27.7
	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.8	8.8	10.9	12.9	15.0	17.0	19.1	21.1	23.2	25.3	27.3
	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.3	10.4	12.4	14.5	16.6	18.6	20.7	22.8	24.9	27.0
	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	7.8	9.9	11.9	14.0	16.1	18.2	20.3	22.4	24.5	26.7
	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	7.2	9.3	11.5	13.6	15.7	17.8	19.9	22.1	24.2	26.3
	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	8.8	11.0	13.1	15.2	17.4	19.5	21.7	23.8	26.0
	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.3	10.5	12.6	14.8	17.0	19.1	21.3	23.5	25.7
	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.7	7.9	10.0	12.2	14.4	16.6	18.7	21.0	23.2	25.4
	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	7.4	9.5	11.7	13.9	16.1	18.4	20.6	22.8	25.1
	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.9	9.1	11.3	13.5	15.7	18.0	20.2	22.5	24.7
	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.4	8.6	10.8	13.1	15.3	17.6	19.9	22.1	24.4
111	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.9	8.1	10.4	12.6	14.9	17.2	19.5	21.8	24.1	
112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.4	7.6	9.9	12.2	14.5	16.8	19.1	21.5	23.8	
113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.2	9.5	11.8	14.1	16.4	18.8	21.1	23.5	
114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.7	9.0	11.4	13.7	16.1	18.4	20.8	23.2	
115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.2	8.6	10.9	13.3	15.7	18.1	20.5	22.9	

Site Address

Permit Number

Table K-2: Target Temperature Split (Return Dry-Bulb – Supply Dry-Bulb)

		Return Air Wet-Bulb (°F) ($T_{\text{return, wb}}$)																											
		50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	
Return Air Dry-Bulb (°F) ($T_{\text{return, db}}$)	70	20.9	20.7	20.6	20.4	20.1	19.9	19.5	19.1	18.7	18.2	17.7	17.2	16.5	15.9	15.2	14.4	13.7	12.8	11.9	11.0	10.0	9.0	7.9	6.8	5.7	4.5	3.2	
	71	21.4	21.3	21.1	20.9	20.7	20.4	20.1	19.7	19.3	18.8	18.3	17.7	17.1	16.4	15.7	15.0	14.2	13.4	12.5	11.5	10.6	9.5	8.5	7.4	6.2	5.0	3.8	
	72	21.9	21.8	21.7	21.5	21.2	20.9	20.6	20.2	19.8	19.3	18.8	18.2	17.6	17.0	16.3	15.5	14.7	13.9	13.0	12.1	11.1	10.1	9.0	7.9	6.8	5.6	4.3	
	73	22.5	22.4	22.2	22.0	21.8	21.5	21.2	20.8	20.3	19.9	19.4	18.8	18.2	17.5	16.8	16.1	15.3	14.4	13.6	12.6	11.7	10.6	9.6	8.5	7.3	6.1	4.8	
	74	23.0	22.9	22.8	22.6	22.3	22.0	21.7	21.3	20.9	20.4	19.9	19.3	18.7	18.1	17.4	16.6	15.8	15.0	14.1	13.2	12.2	11.2	10.1	9.0	7.8	6.6	5.4	
	75	23.6	23.5	23.3	23.1	22.9	22.6	22.2	21.9	21.4	21.0	20.4	19.9	19.3	18.6	17.9	17.2	16.4	15.5	14.7	13.7	12.7	11.7	10.7	9.5	8.4	7.2	5.9	
	76	24.1	24.0	23.9	23.7	23.4	23.1	22.8	22.4	22.0	21.5	21.0	20.4	19.8	19.2	18.5	17.7	16.9	16.1	15.2	14.3	13.3	12.3	11.2	10.1	8.9	7.7	6.5	
	77	-	24.6	24.4	24.2	24.0	23.7	23.3	22.9	22.5	22.0	21.5	21.0	20.4	19.7	19.0	18.3	17.5	16.6	15.7	14.8	13.8	12.8	11.7	10.6	9.5	8.3	7.0	
	78	-	-	-	24.7	24.5	24.2	23.9	23.5	23.1	22.6	22.1	21.5	20.9	20.2	19.5	18.8	18.0	17.2	16.3	15.4	14.4	13.4	12.3	11.2	10.0	8.8	7.6	
	79	-	-	-	-	-	24.8	24.4	24.0	23.6	23.1	22.6	22.1	21.4	20.8	20.1	19.3	18.5	17.7	16.8	15.9	14.9	13.9	12.8	11.7	10.6	9.4	8.1	
	80	-	-	-	-	-	-	25.0	24.6	24.2	23.7	23.2	22.6	22.0	21.3	20.6	19.9	19.1	18.3	17.4	16.4	15.5	14.4	13.4	12.3	11.1	9.9	8.7	
	81	-	-	-	-	-	-	-	25.1	24.7	24.2	23.7	23.1	22.5	21.9	21.2	20.4	19.6	18.8	17.9	17.0	16.0	15.0	13.9	12.8	11.7	10.4	9.2	
	82	-	-	-	-	-	-	-	-	25.2	24.8	24.2	23.7	23.1	22.4	21.7	21.0	20.2	19.3	18.5	17.5	16.6	15.5	14.5	13.4	12.2	11.0	9.7	
	83	-	-	-	-	-	-	-	-	-	25.3	24.8	24.2	23.6	23.0	22.3	21.5	20.7	19.9	19.0	18.1	17.1	16.1	15.0	13.9	12.7	11.5	10.3	
	84	-	-	-	-	-	-	-	-	-	-	25.9	25.3	24.8	24.2	23.5	22.8	22.1	21.3	20.4	19.5	18.6	17.6	16.6	15.6	14.4	13.3	12.1	10.8

Site Address

Permit Number

DUCT LOCATION AND AREA REDUCTION DIAGNOSTICS

DUCT IN CONDITIONED SPACE

Yes No Duct in conditioned space criteria matches CF-1R

Yes is a Pass Pass Fail

REDUCED DUCT SURFACE AREA

Measured duct exterior surface area in the following unconditioned duct locations (square feet):

Attics

Crawlspaces

Basements

Other (e.g., garages, etc.)

Yes No Duct surface area matches CF-1R?

Yes is a Pass Pass Fail

I, the undersigned, verify that the duct surface area and duct locations claimed for duct surface area reductions and duct location improvements beyond those covered by default assumptions match those on the plans. [The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or sub-contractors certifying that diagnostic testing and installation meet the requirements for compliance credit.]

Tests

Performed

COPY TO:

Building Department
HERS Provider (if applicable)
Building Owner at Occupancy

Signature, Date

Installing Subcontractor (Co. Name) OR
General Contractor (Co. Name)

Site Address

Permit Number

BUILDING ENVELOPE LEAKAGE DIAGNOSTICS

ENVELOPE SEALING INFILTRATION REDUCTION

Diagnostic Testing Results

Building Envelope Leakage (CFM @ 50 Pa) as measured by Rater

- 1. Is measured envelope leakage less than or equal to the required level from CF-1R?
2. Is Mechanical Ventilation shown as required on the CF-1R?
2a. If Mechanical Ventilation is required on the CF-1R (Yes in line 2), has it been installed?
2b. Check this box yes if mechanical ventilation is required (Yes in line 2) and ventilation fan watts are no greater than shown on CF-1R.
3. Check this box yes if measured building infiltration (CFM @ 50 Pa) is greater than the CFM @ 50 values shown for an SLA of 1.5 on CF-1R (If this box is checked no, mechanical ventilation is required.)
4. Check this box yes if measured building infiltration (CFM @ 50 Pa) is less than the CFM @ 50 values shown for an SLA of 1.5 on CF-1R, mechanical ventilation is installed and house pressure is greater than minus 5 Pascal with all exhaust fans operating.

Pass if:

- d. Yes in line 1 and line 3, or
e. Yes in line 1 and line 2, 2a, and 2b, or
f. Yes in line 1 and Yes in line 4.

Otherwise fail.

Pass Fail

I, the undersigned, verify that the building envelope leakage meets the requirements claimed for building leakage reduction below default assumptions as used for compliance on the CF-1R. This is to certify that the above diagnostic test results and the work I performed associated with the test(s) is in conformance with the requirements for compliance credit. [The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or sub-contractors certifying that diagnostic testing and installation meet the requirements for compliance credit.]

Test Performed Signature Date Testing Subcontractor (Co. Name) OR General Contractor (Co. Name)

COPY TO: Building Department
HERS Provider (if applicable)
Building Owner at Occupancy

Site Address

Permit Number

The following is an explanation of many of the input values required on this form:

HVAC SYSTEMS

Heating Equipment Type must be one of the following:

Furnace:	Gas (including Liquefied Petroleum Gases) or oil-fired central furnace & space heater
Boiler:	Gas or oil-fired boiler
PckgHeatPump:	Packaged central heat pump
SplitHeatPump:	Split central heat pump
RoomHeatPump:	Room heat pump
LgPkgHeatPump:	Large packaged heat pump (≥ 65,000 Btu/hr output)
Electric:	Electric resistance heating (fixed HSPF = 3.413); radiant electric resistance (fixed HSPF = 3.55)
CombinedHydro:	Reference water heater under water heating systems below

CEC Certified Manufacturer Name & Model Number from applicable Commission approved appliance directory.

of Identical Systems is for those systems with the same efficiency, duct location, duct R-value and capacity.

Efficiency from applicable Commission certified appliance directory.

Duct (or Piping) Location is attic, crawl space, CVC crawl space, conditioned space, unconditioned space or none.

Duct (or Piping) R-Value from Directory of Certified Insulation Materials and/or manufacturer's data.

Heating/Cooling Load refer to Commission approved load calculation procedure.

Heating/Cooling Capacity from the applicable Commission certified appliance directory. Note: location elevations over 2,000 ft above sea level require a derating of output capacity (refer to manufacturer's literature).

Cooling Equipment Type must be one of the following:

SplitAirCond:	Split system air conditioner
PckgAirCond:	Packaged air conditioner
Split Heat Pump:	Split system heat pump
PckgHeatPump:	Packaged heat pump
RoomHeatPump:	Room heat pump
LgPkgHeatPump:	Large packaged heat pump (≥ 65,000 Btu/hr output). Substitute EER for SEER when SEER is not available
RoomAirCond:	Room air conditioner. Minimum SEER varies*
LgPkgAirCond:	Large packaged air conditioner (≥ 65,000 Btu/hr output). Substitute EER for SEER when SEER is not available
EvapDirect:	Direct evaporative cooling system. For compliance calculation purposes, fixed values: SEER = 11.0; duct location = attic; duct insulation R-value = 4.2
EvapIndirect:	Indirect evaporative cooling system. For compliance calculation purposes, fixed values: SEER = 13.0; duct location = attic; duct insulation R-value = 4.2

*Refer to Energy Commission publication *Appliance Efficiency Regulations*, P400-92-029

Site Address

Permit Number

The following is an explanation of many of the input values required on this form:

WATER HEATING SYSTEMS

Distribution Systems Refer to *Residential Manual* for more details:

Standard:	Standard – Supply pressure based system, no pumps
Pipe Insulation:	Pipe Insulation on all 3/4-inch pipes
POU/HWR:	Point of Use/Hot Water Recovery System
Recirc/NoControl:	Recirculation loop with no controls
Recirc/Timer:	Recirculation loop with a timer
Recirc/Temp:	Recirculation loop with temperature control
Recirc/Time+Temp:	Recirculation loop with a timer and temperature control
Recirc/Demand:	Recirculation loop with demand control

Water Heater Type

	Information Needed			
	<u>Energy Factor</u>	<u>Recovery Efficiency</u>	<u>Standby Loss</u>	<u>Rated Input</u>
Storage Gas, Oil or Electric	Yes	No	No	No
Heat Pump	Yes	No	No	No
Instantaneous Gas	No	Yes	No	No
Instantaneous Electric	Yes	No	No	No
Large Storage Gas	No	Yes	Yes	Yes
Indirect Gas (Boiler)	No	Yes (AFUE)	No	Yes

FENESTRATION/GLAZING

Fenestration:	Windows, sliding glass doors, French doors, skylights, garden windows, and any door with more than one square foot of glass
Operator Type:	Slider, hinged, fixed
U-Factor:	Installed U-Factor must be less than or equal to value from CF-1R OR Installed weighted average U-Factor for the total fenestration area is less than or equal to value from CF-1R
SHGC:	Installed SHGC must be less than or equal to value from CF-1R OR Installed weighted SHGC for the total fenestration area is less than or equal to value from CF-1R OR An interior shading device, overhang, or exterior shading device is installed consistent with the CF-1R
Shading Device:	Include when the building complied using an <i>exterior</i> shading device: woven sunscreen, louvered sunscreen, low sun angle sunscreen, roll-down awning, roll-down blinds or slats (do not list bug screen), or an overhang (include depth in feet)

Site Address

Permit Number

The following is an explanation of many of the input values required on the Diagnostic portion of this form (page 3 of 6):

TYPE OF CREDIT

Refer to *Residential Manual* Chapters 4 and 5 for more details:

Reduced Duct Surface Area:	Calculated as the outside area of the duct. Areas must be measured and verified by a HERS rater.
Improved Duct Location:	Supply duct located in other than attic, as verified by location of registers (does not require HERS rater verification).
Catastrophic Leakage:	Pressure pan test readings must be less than 1.5 Pascal at a house pressure of 25 Pascal.
TXV:	Access cover required to facilitate verification.
Infiltration Reduction:	Infiltration is measured without mechanical ventilation operating. Mechanical ventilation is required for very tight house construction when credits for infiltration reduction using diagnostic testing are being used for achieving compliance. These very tight houses are defined as those with SLA of less than 1.5. The compliance documentation (CF-1R) will contain the measured CFM target value from a blower door test at 50 Pascal pressure difference that represents this SLA of 1.5. Mechanical ventilation is also required if the builder chooses to design the building to use mechanical ventilation and claims a credit for infiltration below an SLA of 3.0. The compliance documentation (CF-1R) will contain the measured CFM target value that represents this 3.0 SLA. If the builder claims credit in a design for infiltration reduction that is at an SLA of 3.0 or higher, and the actual measured SLA is 1.5 or greater, then mechanical ventilation is not required. If the SLA in this case were below 1.5, then mitigation (such as mechanical ventilation) would be required.

Site Address

Permit Number

Number and Street

City

County

Subdivision

Lot Number

Description of Installation

1. ROOF

Material _____
Thickness (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

2. CEILING

Batt or Blanket Type _____
Thickness (inches) _____
Loose Fill Type _____
Contractor's min installed weight/ft² _____ lb
Manufacturer's installed weight per square foot to achieve Thermal Resistance (R-Value) _____

Brand Name _____
Thermal Resistance (R-Value) _____
Brand _____
Minimum thickness _____ inches

3. EXTERIOR WALL

Frame Type _____

A. Cavity Insulation

Material _____
Thickness (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

B. Exterior Foam Sheathing

Material _____
Thickness (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

4. RAISED FLOOR

Material _____
Thickness (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

5. SLAB FLOOR/PERIMETER

Material _____
Thickness (inches) _____
Perimeter Insulation Depth (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

6. FOUNDATION WALL

Material _____
Thickness (inches) _____

Brand Name _____
Thermal Resistance (R-Value) _____

Declaration

I hereby certify that the above insulation was installed in the building at the above location in conformance with the current *Energy Efficiency Standards* for residential buildings (Title 24, Part 6, California Code of Regulations) as indicated on the Certificate of Compliance, where applicable.

Item #s

Signature, Date

Installing Subcontractor (Co. Name) OR
General Contractor (Co. Name) OR Owner

Item #s

Signature, Date

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