

BUILDING ENERGY ANALYSIS REPORT

PROJECT:

Sample Single Story Prescriptive Office Building
1057 Green Street
Sacramento, CA 91123

Project Designer:

143 67th Avenue
Oakland, CA 91111
(510) 112-1222

Report Prepared by:

Martyn C. Dodd
EnergySoft, LLC
1025 5th St. Suite A
Novato, CA 94945
(415) 897-6400

Job Number:

H97087-JO

Date:

10/25/2016

The EnergyPro computer program has been used to perform the calculations summarized in this compliance report. This program has approval and is authorized by the California Energy Commission for use with both the Residential and Nonresidential 2016 Building Energy Efficiency Standards.

This program developed by EnergySoft Software – www.energysoft.com.

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MECHANICAL VENTILATION AND REHEAT

CEC-NRCC-MCH-03-E (Revised 05/16)



CERTIFICATE OF COMPLIANCE

NRCC-MCH-03-E

Mechanical Ventilation & Reheat

(Page 1 of 2)

Project Name: Sample Single Story Prescriptive Office Building

Date Prepared: 10/25/2016

A. Mechanical Ventilation and Reheat																				
ACTUAL DESIGN INFO (FROM EQUIPMENT SCHEDULES, ETC)						AREA BASIS			OCCUPANCY BASIS			ROOM BASIS	MINIMUM		VAV Reheated Primary Air CFM			VAV Deadband Primary Air CFM		
01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21
ZONE/ SYSTEM/ VAV BOX TAG	DESIGN PRIMARY COOLING AIRFLOW (CFM)	DESIGN PRIMARY DEADBAND AIRFLOW (CFM)	DESIGN PRIMARY HEATING AIRFLOW (CFM)	CNTRL TYPE DDC (Y/N)	TRANSFER AIRFLOW (CFM)	CONDITIONED AREA (ft ²)	MIN CFM PER AREA	MIN CFM BY AREA	NUM. OF PEOPLE	CFM PER PERSON	MIN CFM BY OCCUPANT	MIN CFM BY ROOM	REQ'D VENT AIRFLOW (CFM)	COMPLIES?	PERCENTAGE BASED DESIGN PRIMARY COOLING AIR (CFM)	MAXIMUM REHEAT (CFM)	COMPLIES?	% BASED DESIGN PRMY COOLING AIR (CFM)	MAX DEAD-BAND AIRFLOW (CFM)	COMPLIES?
North Perimeter						750	0.15	113	3.8	15.0	56	0	113	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A
East Perimeter 2						495	0.15	74	2.5	15.0	37	0	74	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A
West Perimeter						495	0.15	74	2.5	15.0	37	0	74	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A
Core Zone						820	0.15	123	4.1	15.0	62	0	123	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A
													Total	<input type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> N/A
East Perimeter 2						495	0.15	74	2.5	15.0	37	0	74	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A
South Perimeter						750	0.15	113	3.8	15.0	56	0	113	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A			<input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> N/A

MECHANICAL VENTILATION AND REHEAT

CEC-NRCC-MCH-03-E (Revised 05/16)



CERTIFICATE OF COMPLIANCE		NRCC-MCH-03-E
Mechanical Ventilation & Reheat		(Page 2 of 2)
Project Name: Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016	

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT	
1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name: Martyn C. Dodd	Documentation Author Signature:
Company: EnergySoft, LLC	Signature Date: 10/25/2016
Address: 1025 5th St. Suite A	CEA/ HERS Certification Identification (if applicable):
City/State/Zip: Novato, CA 94945	Phone: (415) 897-6400
RESPONSIBLE PERSON'S DECLARATION STATEMENT	
I certify the following under penalty of perjury, under the laws of the State of California:	
<ol style="list-style-type: none"> 1. The information provided on this Certificate of Compliance is true and correct. 2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer). 3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations. 4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application. 5. I will ensure that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building, and made available to the enforcement agency for all applicable inspections. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy. 	
Responsible Designer Name: Bob Designer	Responsible Designer Signature:
Company : Big Mechanical	Date Signed:
Address: 123 Main St.	License:
City/State/Zip: North Platte, NB 03223	Phone: (987) 213-44%%

REQUIRED ACCEPTANCE TESTS

CEC-NRCC-MCH-04-E (Revised 01/16)



CERTIFICATE OF COMPLIANCE		NRCC-MCH-04-E
Required Acceptance Tests		(Page 1 of 3)
Project Name:	Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016

A. MECHANICAL COMPLIANCE FORMS & WORKSHEETS

(indicate if worksheet is included)

For detailed instructions on the use of this and all Energy Standards compliance documents, refer to the 2016 Nonresidential Manual

Note: The Enforcement Agency may require all compliance documents to be incorporated onto the building plans. The NRCC-MCH-04-E and NRCC-MECH-05-E are alternative compliance documents to NRCC-MCH-01-E, NRCC-MCH-02-E and NRCC-MCH-03-E for projects using only single zone packaged HVAC systems.

YES	NO	Form	Title
✓		NRCC-MCH-04-E (1 of 2)	Certificate of Compliance. Required on plans when used.
✓		NRCC-MCH-04-E (2 of 2)	Mechanical Acceptance Tests. Required on plans when used.
✓		NRCC-MCH-05-E (1 of 2)	HVAC Prescriptive Requirements. It is required on plans when used.
✓		NRCC-MCH-05-E (2 of 2)	Mechanical SWH Equipment Summary is required for all submittals with service water heating, pools or spas. It is required on plans where applicable.

REQUIRED ACCEPTANCE TESTS

CEC-NRCC-MCH-04-E (Revised 01/16)



CERTIFICATE OF COMPLIANCE	NRCC-MCH-04-E
Required Acceptance Tests	(Page 2 of 3)
Project Name: Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016

Designer:

This compliance document is to be used by the designer and attached to the plans. Listed below are all the acceptance tests for mechanical systems. The designer is required to check the applicable boxes by all acceptance tests that apply and list all equipment that require an acceptance test. If all equipment of a certain type requires a test, list the equipment description and the number of systems. The NA number designates the Section in the Appendix of the Nonresidential Reference Appendices Manual that describes the test. Since this compliance document will be part of the plans, completion of this section will allow the responsible party to budget for the scope of work appropriately.

Enforcement Agency:

Systems Acceptance. Before occupancy permit is granted for a newly constructed building or space, or a new space-conditioning system serving a building or space is operated for normal use, all control devices serving the building or space shall be certified as meeting the Acceptance Requirements for Code Compliance.

Systems Acceptance. Before occupancy permit is granted. All newly installed HVAC equipment must be tested using the Acceptance Requirements. The NRCC-MCH-04-E compliance document is not considered a completed document and is not to be accepted by the building department unless the correct boxes are checked. The equipment requiring testing, person performing the test (Example: HVAC installer, TAB contractor, controls contractor, PE in charge of project) and what Acceptance test must be conducted. The following checked-off forms are required for ALL newly installed and replaced equipment. In addition a Certificate of Acceptance documents shall be submitted to the building department that certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of Section 10-103(b) and Title 24 Part 6. The building inspector must receive the properly filled out and signed compliance documents before the building can receive final occupancy.

Test Description		MCH-02-A	MCH-03-A	MCH-04-A	MCH-05-A	MCH-06-A	MCH-07-A	MCH-11-A	MCH-12-A	MCH-14-A	MCH-18-A	Test Performed By:
Equipment Requiring Testing or Verification	# of Units	Outdoor Air	Single Zone Unitary	Air Distribution Ducts	Economizer Controls	Demand Control Ventilation (DCV)	Supply Fan VAV	Automatic Demand Shed Control	FDD for Packaged DX Units	Distributed Energy Storage DX AC Systems	Energy Management Control System	
Carrier 48PC	2	✓	✓		✓				✓			

REQUIRED ACCEPTANCE TESTS

CEC-NRCC-MCH-04-E (Revised 01/16)



CERTIFICATE OF COMPLIANCE		NRCC-MCH-04-E
Required Acceptance Tests		(Page 3 of 3)
Project Name: Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016	

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Company: EnergySoft, LLC	Signature Date: 10/25/2016
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City/State/Zip: Novato, CA 94945	Phone: (415) 897-6400
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Responsible Designer Name: Bob Designer	Responsible Designer Signature:
Company: Big Mechanical	Date Signed:
Address: 123 Main St.	License:
City/State/Zip: North Platte, NB 03223	Phone: (987) 213-44%%

REQUIREMENTS FOR PACKAGED SINGLE ZONE UNITS

CEC-NRCC-MCH-05-E (Revised 01/16)

CALIFORNIA ENERGY COMMISSION



CERTIFICATE OF COMPLIANCE		NRCC-MCH-05-E
Requirements for Packaged Single-Zone Units		(Page 1 of 2)
Project Name: Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016	

Equipment Tag(s) ¹	AHU-1		AHU-2		Requirement ³	As Scheduled ³
	T-24 Sections	Requirement ³	As Scheduled ³	Requirement ³		
MANDATORY MEASURES						
Heating Equipment Efficiency ⁴	110.1 or 110.2(a)	78% AFUE	82% AFUE	78% AFUE	82% AFUE	
Cooling Equipment Efficiency ⁴	110.1 or 110.2(a)	11.0 EER	12.0 EER	11.0 EER	12.0 EER	
Thermostats ⁵	110.2(b), 110.2(c)	Setback	Setback	Setback	Setback	
Furnace Standby Loss Control ⁶	110.2(d)	n/a		n/a		
Low Leakage AHU	110.2(f)	NR	none	NR	none	
Ventilation ⁷	120.1(b)	384	192	384	192	
Demand Control Ventilation ⁸	120.1(c)4	NR	No	NR	No	
Occupant Sensor Ventilation Control ⁸	120.1(c)5, 120.2(e)3					
Shutoff and Reset Controls ⁹	120.2(e)	Req	Programmable	Req	Programmable	
Outdoor Air and Exhaust Damper Control	120.2(f)	Req	Auto	Req	Auto	
Automatic Demand Shed Controls	120.2(h)	NR	none	NR	none	
Economizer FDD	120.2(i)	Req		Req		
Duct Insulation	120.4	n/a	none	n/a	none	
PRESCRIPTIVE MEASURES						
Equipment is sized in conformance with 140.4 (a & b)	140.4(a & b)	66,959 Btu/hr 103,575 Btu/h	148,400 Btu/hr 112,534 Btu/hr	70,460 Btu/hr 120,329 Btu/h	148,400 Btu/hr 112,279 Btu/hr	
Economizer	140.4(e)	Req	Diff. Temp (Inte	Req	Diff. Temp (Inte	
Electric Resistance Heating ¹⁰	140.4(g)	No	No	No	No	
Duct Leakage Sealing and Testing. ¹¹	140.4(l)	NR	No	NR	No	

Notes:

- Provide equipment tags (e.g. AC1 or AC1 to 10). Multiple units of the same make and model with the same application and accessories can be grouped together.
- Enter the following information as appropriate: Unit Manufacturer; Unit Model Number (including all accessories); Description of the unit (e.g. gas-pack or heat pump; rated heating capacity (enter "N/A" if no heating); and, rated cooling capacity (enter "N/A" if no cooling). For unit capacities include the units (e.g. kBtu/h or tons).
- For each requirement, enter the minimum requirement from the Standard in the left column (under "Standard Requirement"). In the right column (under "As Scheduled") enter the value for the units as specified.
- Where there is more than one requirement (e.g. full and part load efficiency) enter both with the appropriate labels (e.g. COP and IEER).
- In the left column identify the thermostatic requirements from the standard (e.g. programmable setback thermostat or heat pump with electric heat), . In the right column indicate the capabilities of the thermostat as scheduled.
- If the unit has a furnace which is rated at $\geq 225,000$ Btu/h of capacity, indicate the rated standby loss and ignition source (e.g. IID). If there is no furnace or the unit is rated for $< 225,000$ Btu/h indicate "N/A".
- In the left column, enter both the required ventilation value from Table 120.1A and for the number of occupants times 15 cfm/person. In the right column enter the actual minimum ventilation as scheduled. If the space is naturally ventilated enter "N/A" in the left column and "the space is naturally ventilated" in the right column.
- If the space is required to have either DCV or Occupant Sensor Ventilation Control indicate "required" in the left column (otherwise indicate "N/A" in the left column). If either DCV or Occupant Sensor Ventilation Control is provided indicate "provided" in the right column (otherwise indicate "N/A" in the right column)
- In the left column indicate the required time controls from the standard. In the right column identify the device that provides this functionality (e.g. EMCS or programmable timeclock).
- Enter N/A if there is no electric heating. If the system has electric heating indicate which exception to 140.4(g) applies.
- If duct leakage sealing and testing is required, a **MCH-04-A** compliance document must be submitted.

REQUIREMENTS FOR PACKAGED SINGLE ZONE UNITS


CEC-NRCC-MCH-05-E (Revised 01/16)



CERTIFICATE OF COMPLIANCE		NRCC-MCH-05-E
Requirements for Packaged Single-Zone Units		(Page 2 of 2)
Project Name: Sample Single Story Prescriptive Office Building	Date Prepared: 10/25/2016	

DOCUMENTATION AUTHOR'S DECLARATION STATEMENT

1. I certify that this Certificate of Compliance documentation is accurate and complete.

Documentation Author Name: Martyn C. Dodd	Documentation Author Signature: 
Company: EnergySoft, LLC	Signature Date: 10/25/2016
Address: 1025 5th St. Suite A	CEA/HERS Certification Identification (if applicable):
City/State/Zip: Novato, CA 94945	Phone: (415) 897-6400

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CERTIFICATE OF COMPLIANCE		NRCC-MCH-07-E
Power Consumption of Fans Requirements		(Page 1 of 2)
Project Name: <i>Sample Single Story Prescriptive Office Building</i>	Date Prepared:	<i>10/25/2016</i>

A. Constant Volume Fan Systems

NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Constant Volume Fan Systems when using the Prescriptive Approach. See Power Consumption of fans §140.4(c).

01	02	03		04	05
FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS A02 x A04 x 746 / (A03a x A03b)
		MOTOR	DRIVE		
<i>AHU-1 - Supply Fan</i>	<i>1.790</i>	<i>86.5 %</i>	<i>97.0 %</i>	<i>1.0</i>	<i>1,591</i>

B. Variable Air Volume Fan Systems

NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Variable Air Volume (VAV) Systems when using the Prescriptive Approach. See Power Consumption of fans §140.4(c).

01	02	03		04	05
FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS B02 x B04 x 746 / (B03a x B03b)
		MOTOR	DRIVE		

C. Totals and Adjustments

FILTER PRESSURE ADJUSTMENT Equation 140.4-A in §140.4(c) of the Building Energy Efficiency Standards. A) If filter pressure drop (SP_a) is greater than 1 inch W. C. or 245 Pascal then enter SP_a on line 4. Enter Total Fan pressure drop across the fan (SP_f) on line 5. B) Calculate Fan Adjustment and enter on line 6. C) Calculate Adjusted Fan Power Index and enter on row 7	01	TOTAL FAN SYSTEM POWER (WATTS, SUM COLUMN F)	<i>1,591</i>	W
	02	SUPPLY DESIGN AIRFLOW	<i>4,000</i>	CFM
	03	TOTAL FAN SYSTEM POWER INDEX (Row 1 / Row 2) ¹	<i>0.398</i>	W/CFM
	04	SP_a		in W.C or Pa
	05	SP_f		in W.C or Pa
	06	Fan Adjustment = $1 - (SP_a - 1) / SP_f$		
	07	ADJUSTED FAN POWER INDEX (Line 3 x Line 6) ¹	<i>0.398</i>	W/CFM
1. TOTAL FAN SYSTEM POWER INDEX or ADJUSTED FAN POWER INDEX must not exceed 0.8 W/cfm for Constant Volume systems or 1.25 W/cfm for VAV systems.				

FAN POWER CONSUMPTION

CEC-NRCC-MCH-07-E (Revised 01/16)

CALIFORNIA ENERGY COMMISSION



CERTIFICATE OF COMPLIANCE		NRCC-MCH-07-E
Power Consumption of Fans Requirements		(Page 1 of 2)
Project Name: <i>Sample Single Story Prescriptive Office Building</i>	Date Prepared:	<i>10/25/2016</i>

A. Constant Volume Fan Systems

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		MOTOR	DRIVE		
<i>AHU-2 - Supply Fan</i>	<i>1.790</i>	<i>86.5 %</i>	<i>97.0 %</i>	<i>1.0</i>	<i>1,591</i>

B. Variable Air Volume Fan Systems

NOTE: Provide one copy of this worksheet for each fan system with a total fan system horsepower greater than 25 hp of Variable Air Volume (VAV) Systems when using the Prescriptive Approach. See Power Consumption of fans §140.4(c).

01	02	03		04	05
FAN DESCRIPTION	DESIGN BRAKE HP	EFFICIENCY		NUMBER OF FANS	PEAK WATTS B02 x B04 x 746 / (B03a x B03b)
		MOTOR	DRIVE		

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	04	SP_a		in W.C or Pa
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FAN POWER CONSUMPTION

CEC-NRCC-MCH-07-E (Revised MM/YY)

CALIFORNIA ENERGY COMMISSION



CERTIFICATE OF COMPLIANCE		NRCC-MCH-07-E
Power Consumption of Fans Requirements		(Page 2 of 2)
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