



Generated by COMcheck-Web Software  
**Mechanical Compliance Certificate**

## 2009 IECC

### Section 1: Project Information

Project Type: **New Construction**

Project Title : Courtyard, Portland, ME

Construction Site:

311 Commercial St.  
Portland, Maine

Owner/Agent:

Vincent Veroneau  
J. B. Brown & Sons  
36 Danforth St.  
Portland, Maine 04101  
207-200-2180  
veroneau@jbbrown.com

Designer/Contractor:

Mark Woglom  
Opechee Construction Corporation  
11 Corporate Drive  
Belmont, New Hampshire 03220  
603-527-9090  
markw@opechee.com

### Section 2: General Information

Building Location (for weather data):

**Portland, Maine**

Climate Zone:

**6a**

### Section 3: Mechanical Systems List

#### Quantity System Type & Description

- 118 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 10 kBtu/h,  
Proposed Efficiency = 5.23 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 9 kBtu/h,  
Proposed Efficiency = 13.60 EER, Required Efficiency = 11.20 EER  
Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Fails: FAN 1 : Fan control is unspecified  
  
Fans:  
FAN 1 Supply, Unspecified, 325 CFM, 0.1 motor nameplate hp
- 20 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 29 kBtu/h,  
Proposed Efficiency = 4.93 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 24 kBtu/h,  
Proposed Efficiency = 14.90 EER, Required Efficiency = 12.00 EER  
Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Fails: FAN 1 : Fan control is unspecified  
  
Fans:  
FAN 1 Supply, Unspecified, 325 CFM, 0.1 motor nameplate hp
- 6 HVAC System (Unknown) : Water Source Heat Pump  
Heating Mode: Capacity = 35 kBtu/h,  
Proposed Efficiency = 4.81 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 28 kBtu/h,  
Proposed Efficiency = 14.60 EER, Required Efficiency = 12.00 EER  
Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP method) : Fails: FAN 1 : Fan control is unspecified  
  
Fans:  
FAN 1 Supply, Unspecified, 325 CFM, 0.1 motor nameplate hp
- 3 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 20 kBtu/h,  
Proposed Efficiency = 4.53 COP, Required Efficiency = 4.20 COP

- Cooling Mode: Capacity = 16 kBtu/h,  
Proposed Efficiency = 13.40 EER, Required Efficiency = 11.20 EER  
Fan System: Unspecified
- 3 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 24 kBtu/h,  
Proposed Efficiency = 4.60 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 20 kBtu/h,  
Proposed Efficiency = 12.80 EER, Required Efficiency = 12.00 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 42 kBtu/h,  
Proposed Efficiency = 4.60 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 35 kBtu/h,  
Proposed Efficiency = 14.50 EER, Required Efficiency = 12.00 EER  
Fan System: Unspecified
- 2 HVAC System (Single Zone) : Water Source Heat Pump  
Heating Mode: Capacity = 87 kBtu/h,  
Proposed Efficiency = 4.60 COP, Required Efficiency = 4.20 COP  
Cooling Mode: Capacity = 69 kBtu/h, , Unknown Economizer  
Proposed Efficiency = 12.00 EER, Required Efficiency = 12.00 EER  
Fan System: Unspecified  
SYSTEM COMPLIANCE FAILS: Economizer requirements have not been met.
- 1 HVAC System (Single Zone) :  
Cooling: 3 each - Split System, Capacity = 30 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 16.50 SEER, Required Efficiency = 13.00 SEER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Heating: 1 each - Central Furnace, Gas, Capacity = 216 kBtu/h  
Proposed Efficiency = 92.00% Et, Required Efficiency = 80.00% Et  
Fan System: Unspecified
- 1 HVAC System (Single Zone) :  
Heating: 1 each - Central Furnace, Gas, Capacity = 415 kBtu/h  
Proposed Efficiency = 92.00% Ec, Required Efficiency = 80.00% Ec  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 63 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.50 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 95 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.40 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 63 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.50 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 93 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.50 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 96 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.40 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 94 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.40 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 99 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.40 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified

- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 63 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.50 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 124 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 12.00 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 24 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 11.40 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 1 HVAC System (Single Zone w/ Perimeter System) :  
Cooling: 1 each - Packaged Terminal Unit, Capacity = 36 kBtu/h, Air-Cooled Condenser  
Proposed Efficiency = 13.20 EER, Required Efficiency = 9.30 EER  
Fan System: Unspecified
- 3 Plant:  
Heating: Hot Water Boiler, Capacity 2781 kBtu/h, Gas, with Waterloop Heat Pump  
Proposed Efficiency: 92.70 % Ec, Required Efficiency: 80.00 % Ec
- 4 Water Heater:  
Gas Storage Water Heater, Capacity: 436 gallons, Input Rating: 75 Btu/h w/ Circulation Pump  
No minimum efficiency requirement applies

## Section 4: Requirements Checklist

### Requirements Specific To: HVAC System :

1. Equipment minimum efficiency: Heat Pump: 4.20 COP 11.20 EER
2. Heat pump thermostat required when supplemental electric resistance heat is installed
3. Loop temperature controlled with 20 degrees F deadband where neither cooling tower/fluid cooler nor boiler can operate
4. Two-position valve on each heat pump having total heat pump system power >10hp
5. Open- or closed-circuit cooling tower has a separate heat exchanger that isolates the cooling tower from the heat pump loop, and a means of shutting down the circulation pump on the cooling tower loop, and an automatic valve to stop all flow of fluid.

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**Requirements Specific To: HVAC System :**

- 1. Equipment minimum efficiency: Split System: 13.00 SEER

**Requirements Specific To: HVAC System :**

- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)

**Requirements Specific To: HVAC System :**

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- 3. Hot gas bypass limited to 50% of total cooling capacity

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#### Requirements Specific To: Plant :

- 1. Equipment minimum efficiency: Boiler Combustion Efficiency 80% Ec
- 2. Loop temperature controlled with 20 degrees F deadband where neither cooling tower/fluid cooler nor boiler can operate
- 3. Two-position valve on each heat pump having total heat pump system power >10hp
- 4. Newly purchased heating equipment meets the efficiency requirements  
- used equipment must meet 80% Et @ maximum capacity
- 5. Systems with multiple boilers have automatic controls capable of sequencing boiler operation
- 6. Hydronic heating systems comprised of a single boiler and >500 kBtu/h input design capacity include either a multistaged or modulating burner

#### Requirements Specific To: Water Heater :

- 1. Water heating equipment meets minimum efficiency requirements: Gas Storage Water Heater efficiency: No efficiency requirement applies.
- 2. All piping in circulating system insulated
- 3. Hot water storage temperature controls that allow setpoint of 90°F for non-dwelling units and 110°F for dwelling units.
- 4. Automatic time control of heat tapes and recirculating systems present
- 5. Controls will shut off operation of circulating pump between water heater/boiler and storage tanks within 5 minutes after end of heating cycle

#### Generic Requirements: Must be met by all systems to which the requirement is applicable:

- 1. Plant equipment and system capacity no greater than needed to meet loads  
*Exception(s):*
  - Standby equipment automatically off when primary system is operating
  - Multiple units controlled to sequence operation as a function of load
- 2. Minimum one temperature control device per system
- 3. Minimum one humidity control device per installed humidification/dehumidification system
- 4. Load calculations per ASHRAE/ACCA Standard 183.
- 5. Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup  
*Exception(s):*
  - Continuously operating zones
- 6. Outside-air source for ventilation; system capable of reducing OSA to required minimum
- 7. R-5 supply and return air duct insulation in unconditioned spaces  
R-8 supply and return air duct insulation outside the building  
R-8 insulation between ducts and the building exterior when ducts are part of a building assembly  
*Exception(s):*
  - Ducts located within equipment
  - Ducts with interior and exterior temperature difference not exceeding 15°F.
- 8. Mechanical fasteners and sealants used to connect ducts and air distribution equipment
- 9. Ducts sealed - longitudinal seams on rigid ducts; transverse seams on all ducts; UL 181A or 181B tapes and mastics
- 10. Hot water pipe insulation: 1.5 in. for pipes <=1.5 in. and 2 in. for pipes >1.5 in.  
Chilled water/refrigerant/brine pipe insulation: 1.5 in. for pipes <=1.5 in. and 1.5 in. for pipes >1.5 in.  
Steam pipe insulation: 1.5 in. for pipes <=1.5 in. and 3 in. for pipes >1.5 in.  
*Exception(s):*
  - Piping within HVAC equipment.
  - Fluid temperatures between 55 and 105°F.
  - Fluid not heated or cooled with renewable energy.
  - Piping within room fan-coil (with AHRI440 rating) and unit ventilators (with AHRI840 rating).
  - Runouts <4 ft in length.
- 11. Operation and maintenance manual provided to building owner
- 12. Hot water distribution systems >= 300 kBtu/h must have one of the following:
  - a) controls that reset supply water temperature by 25% of supply/return delta T

- b) mechanical or electrical adjustable-speed pump drive(s)
- c) two-way valves at all heating coils
- d) multiple-stage pumps
- e) other system controls that reduce pump flow by at least 50% based on load  
- calculations required

Exception(s):

- Where the supply temperature reset controls cannot be implemented without causing improper operation of heating, cooling, humidification, or dehumidification systems.
- Hydronic systems that use variable flow to reduce pumping energy.

13. Balancing devices provided in accordance with IMC 603.17

14. Demand control ventilation (DCV) present for high design occupancy areas (>40 person/1000 ft<sup>2</sup> in spaces >500 ft<sup>2</sup>) and served by systems with any one of 1) an air-side economizer, 2) automatic modulating control of the outdoor air damper, or 3) a design outdoor airflow greater than 3000 cfm.

Exception(s):

- Systems with heat recovery.
- Multiple-zone systems without DDC of individual zones communicating with a central control panel.
- Systems with a design outdoor airflow less than 1200 cfm.
- Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.

15. Total cooling capacity without economizers must be less than 480 kBtu/h. This project lists 2931 kBtu/h capacity without economizers.

16. Motorized, automatic shutoff dampers required on exhaust and outdoor air supply openings

Exception(s):

- Gravity dampers acceptable in buildings <3 stories

17. Automatic controls for freeze protection systems present

18. Exhaust air heat recovery included for systems 5,000 cfm or greater with more than 70% outside air fraction or specifically exempted

Exception(s):

- Hazardous exhaust systems, commercial kitchen and clothes dryer exhaust systems that the International Mechanical Code prohibits the use of energy recovery systems.
- Systems serving spaces that are heated and not cooled to less than 60°F.
- Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
- Heating systems in climates with less than 3600 HDD.
- Cooling systems in climates with a 1 percent cooling design wet-bulb temperature less than 64°F.
- Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
- Laboratory fume hood exhaust systems that have either a variable air volume system capable of reducing exhaust and makeup air volume to 50 percent or less of design values or, a separate make up air supply meeting the following makeup air requirements:
  - a) at least 75 percent of exhaust flow rate, b) heated to no more than 2°F below room setpoint temperature, c) cooled to no lower than 3°F above room setpoint temperature, d) no humidification added, e) no simultaneous heating and cooling.

## Section 5: Compliance Statement

*Compliance Statement:* The proposed mechanical design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2009 IECC requirements in COMcheck-Web and to comply with the mandatory requirements in the Requirements Checklist.

STEPHEN DOEL, V.P.  
Name, Title

*A Doel*  
Signature

5/1/14  
Date

## Section 6: Post Construction Compliance Statement

- HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
- HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
- Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name

Signature

Date