City of Aurora
Building Codes Division
15151 E Alameda Pkwy
Aurora, CO 80012
(303) 739-7420

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Mechanical Compliance Certificate

2006 IECC

Section 1: Project Information

Project Type: **Addition**
Project Title :

Construction Site:

Owner/Agent:

Designer/Contractor:
Tyler Fritz
ccrd partners
8301 E. Prentice Ave
Suite 200
Greenwood Village, CO 80111
303.694.4755

09-443746
09-443744

Section 2: General Information

Building Location (for weather data):	**Aurora, Colorado**
Climate Zone:	**5b**
Heating Degree Days (base 65 degrees F):	**6020**
Cooling Degree Days (base 50 degrees F):	**2732**

Section 3: Mechanical Systems List

Quantity	System Type & Description
1	HVAC System 1: Heating: Other, Electric, Capacity 62 kBtu/h / Cooling: Field-Assembled DX System, Capacity 45 kBtu/h, Air-Cooled Condenser / Single Zone
1	Water Heater 1: Electric Storage Water Heater, Capacity: 50 gallons w/ Circulation Pump

Section 4: Requirements Checklist

Requirements Specific To: HVAC System 1 :

☐ 1. Specified equipment consists of field-assembled components - efficiency documentation provided

Requirements Specific To: Water Heater 1 :

☐ 1. Hot water system sized per manufacturer's sizing guide
☐ 2. Electric Water Heater efficiency: 0.9 EF (267 SL, Btu/h (if > 12 kW))
☐ 3. All piping in circulating system insulated
☐ 4. Hot water storage temperature adjustable down to 120 degrees F or lower
☐ 5. Automatic time control of heat tapes and recirculating systems present
☐ 6. 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. Load calculations per 2001 ASHRAE Fundamentals
☐ 2. Plant equipment and system capacity no greater than needed to meet loads
- Exception: Standby equipment automatically off when primary system is operating
- Exception: Multiple units controlled to sequence operation as a function of load

☐ 3. Minimum one temperature control device per system
☐ 4. Minimum one humidity control device per installed humidification/dehumidification system
☐ 5. Automatic Controls: Setback to 55 degrees F (heat) and 85 degrees F (cool); 7-day clock, 2-hour occupant override, 10-hour backup

- Exception: Continuously operating zones
- Exception: 2 kW demand or less, submit calculations

☐ 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: Ducts located within equipment
- Exception: Ducts with interior and exterior temperature difference not exceeding 15 degrees F.
- Exception: Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures less than 2 inches w.g. pressure classification

☐ 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 in. for pipes <=1.5 in. and 2 in. for pipes >1.5 in. Chilled water/refrigerant/brine pipe insulation: 1 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: Piping within HVAC equipment.
- Exception: Fluid temperatures between 55 and 105 degrees F.
- Exception: Fluid not heated or cooled.
- Exception: Runouts <4 ft in length.

☐ 11. Operation and maintenance manual provided to building owner
☐ 12. Piping, insulated to 1/2 in. if nominal diameter of pipe is <1.5 in.; Larger pipe insulated to 1 in. thickness
☐ 13. Lavatory faucet outlet temperatures in public restrooms limited to 110 degrees F (43 degrees C)
☐ 14. Thermostatic controls have 5 degrees F deadband
- Exception: Thermostats requiring manual changeover between heating and cooling
- Exception: Special occupancy or special applications where wide temperature ranges are not acceptable and are approved by the authority having jurisdiction.

☐ 15. Balancing devices provided in accordance with IMC (2006) 603.17
☐ 16. Motorized, automatic shutoff dampers required on exhaust and outdoor air supply openings
- Exception: Gravity dampers acceptable in buildings <3 stories
- Exception: Gravity dampers acceptable in systems with outside or exhaust air flow rates less than 300 cfm where dampers are interlocked with fan

☐ 17. Stair and elevator shaft vents are equipped with motorized dampers

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 2006 IECC requirements in COM*check* Version 3.6.1 and to comply with the mandatory requirements in the Requirements Checklist.

Andrew Bennett - Mechanical Eng. | Signature | 12-08-09
Name - Title | Signature | Date

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Mechanical Requirements Description

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The following list provides more detailed descriptions of the requirements in Section 4 of the Mechanical Compliance Certificate.

Requirements Specific To: HVAC System 1 :

1. The specified cooling system consists of field-assembled components. Documentation must be submitted showing the system meets ASHRAE 90.1 Code equipment efficiency requirements for a comparable package equipment type and capacity range.

Requirements Specific To: Water Heater 1 :

1. Service water heating system design loads for the purpose of sizing systems and equipment must be determined in accordance with manufacturers' published sizing guidelines.
2. Service water heating equipment used solely for heating potable water, pool heaters, and hot water storage tanks must meet the following miniumum efficiency: Electric Water Heater efficiency: 0.9 EF (267 SL, Btu/h (if > 12 kW))
3. Insulation must be provided for recirculating system piping, including the supply and return piping of a circulating tank type water heater.
4. Temperature controls must be provided that allow for storage temperature adjustment from 120 degrees F or lower to a maximum temperature compatible with the intended use except when the manufacturer's installation instructions specify a higher minimum thermostat setting to minimize condensation and resulting corrosion. Documentation of the installation instructions must be provided to be exempted from this requirement.
5. Systems designed to maintain usage temperatures in hot water pipes, such as recirculating hot water systems or heat trace, must be equipped with automatic time switches or other controls that can be set to switch off the temperature maintenance system during extended periods when hot water is not required.
6. When used to maintain storage tank water temperature, recirculating pumps must be equipped with controls limiting operation to the start of the heating cycle to a maximum of 5 minutes after the end of the heating cycle.

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

1. Design heating and cooling loads for the building must be determined using procedures in the ASHRAE Handbook of Fundamentals or an approved equivalent calculation procedure.
2. All equipment and systems must be sized to be no greater than needed to meet calculated loads. A single piece of equipment providing both heating and cooling must satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.
   - Exception: The equipment and/or system capacity may be greater than calculated loads for standby purposes. Standby equipment must be automatically controlled to be off when the primary equipment and/or system is operating.
   - Exception: Multiple units of the same equipment type whose combined capacities exceed the calculated load are allowed if they are provided with controls to sequence operation of the units as the load increases or decreases.
3. Each heating or cooling system serving a single zone must have its own temperature control device.
4. Each humidification system must have its own humidity control device.
5. The system or zone control must be a programmable thermostat or other automatic control meeting the following criteria: a) capable of setting back temperature to 55 degrees F during heating and setting up to 85 degrees F during cooling, b) capable of automatically setting back or shutting down systems during unoccupied hours using 7 different day schedules, c) have an accessible 2-hour occupant override, d) have a battery back-up capable of maintaining programmed settings for at least 10 hours without power.
   - Exception: A setback or shutoff control is not required on thermostats that control systems serving areas that operate continuously.
   - Exception: A setback or shutoff control is not required on systems with total energy demand of 2 kW (6,826 Btu/h) or less.
6. The system must supply outside ventilation air as required by Chapter 4 of the International Mechanical Code. If the ventilation system is designed to supply outdoor-air quantities exceeding minimum required levels, the system must be capable of reducing outdoor-air flow to the minimum required levels.
7. Air ducts must be insulated to the following levels: a) Supply and return air ducts for conditioned air located in unconditioned spaces (spaces neither heated nor cooled) must be insulated with a minimum of R-5. Unconditioned spaces include attics, crawl spaces, unheated basements, and unheated garages. b) Supply and return air ducts and plenums must be insulated to a minimum of R-8 when located outside the building. c) When ducts are located within exterior components (e.g., floors or roofs), minimum R-8 insulation is required only between the duct and the building exterior.
   - Exception: Duct insulation is not required on ducts located within equipment.
   - Exception: Duct insulation is not required when the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15 degrees F.

   - Exception: Continuously welded and locking-type longitudinal joints and seams on ducts operating at static pressures less than 2 inches w.g. pressure classification.
8. Mechanical fasteners and seals, mastics, or gaskets must be used when connecting ducts to fans and other air distribution equipment, including multiple-zone terminal units.
9. All joints, longitudinal and transverse seams, and connections in ductwork must be securely sealed using weldments; mechanical fasteners with seals, gaskets, or mastics; mesh and mastic sealing systems; or tapes. Tapes and mastics must be listed and labeled in accordance with UL 181A and shall be marked '181A-P' for pressure sensitive tape, '181A-M' for mastic or '181A-H' for heat-sensitive tape. Tapes and mastics used to seal flexible air ducts and flexible air connectors shall comply with UL 181B and shall be marked '181B-FX' for pressure-sensitive tape or '181B-M' for mastic. Unlisted duct tape is not permitted as a sealant on any metal ducts.
10. All pipes serving space-conditioning systems must be insulated as follows: Hot water piping for heating systems: 1 in. for pipes <=1 1/2-in. nominal diameter, 2 in. for pipes >1 1/2-in. nominal diameter. Chilled water, refrigerant, and brine piping systems: 1 in. insulation for pipes <=1 1/2-in. nominal diameter, 1 1/2 in. insulation for pipes >1 1/2-in. nominal diameter. Steam piping: 1 1/2 in. insulation for pipes <=1 1/2-in. nominal diameter, 3 in. insulation for pipes >1 1/2-in. nominal diameter.
    - Exception: Pipe insulation is not required for factory-installed piping within HVAC equipment.
    - Exception: Pipe insulation is not required for piping that conveys fluids having a design operating temperature range between 55 degrees F and 105 degrees F.
    - Exception: Pipe insulation is not required for piping that conveys fluids that have not been heated or cooled through the use of fossil fuels or electric power.
    - Exception: Pipe insulation is not required for runout piping not exceeding 4 ft in length and 1 in. in diameter between the control valve and HVAC coil.
11. Operation and maintenance documentation must be provided to the owner that includes at least the following information: a) equipment capacity (input and output) and required maintenance actions b) equipment operation and maintenance manuals c) HVAC system control maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions; desired or field-determined set points must be permanently recorded on control drawings, at control devices, or, for digital control systems, in programming comments d) complete narrative of how each system is intended to operate.
12. Service hot water piping, where required, must be insulated to 1/2 in. if pipe less than 1.5 in. nominal diameter. Larger pipe must be insulated to 1 in.. Pipe insulation will have a conductivity of less than 0.28 Btu.in/(h-ft2-degrees F).
13. Temperature controlling means must be provided to limit the maximum temperature of water delivered from lavatory faucets in public facility restrooms to 110 degrees F.
14. Thermostats controlling both heating and cooling must be capable of maintaining a 5 degrees F deadband (a range of temperature where no heating or cooling is provided).
    - Exception: Deadband capability is not required if the thermostat does not have automatic changeover capability between heating and cooling.
    - Exception: Special occupancy or special applications where wide temperature ranges are not acceptable and are approved by the authority having jurisdiction.
15. Replaced with
16. Outdoor air supply and exhaust systems must have motorized dampers that automatically shut when the systems or spaces served are not in use. Dampers must be capable of automatically shutting off during preoccupancy building warm-up, cool-down, and setback, except when ventilation reduces energy costs (e.g., night purge) or when ventilation must be supplied to meet code requirements. Both outdoor air supply and exhaust air dampers must have a maximum leakage rate of 3 cfm/ft2 at 1.0 in w.g. when tested in accordance with AMCA Standard 500.
    - Exception: Gravity (non-motorized) dampers are acceptable in buildings less than three stories in height.
    - Exception: Systems with a design outside air intake or exhaust capacity of 300 cfm (140 L/s) or less that are equipped with motor operated dampers that open and close when the unit is energized and de-energized, respectively.
17. Stair and elevator shaft vents must be equipped with motorized dampers capable of being automatically closed during normal building operation and interlocked to open as required by fire and smoke detection systems. All gravity outdoor air supply and exhaust hoods, vents, and ventilators must be equipped with motorized dampers that will automatically shut when the spaces served are not in use.
    - Exception: Gravity (non-motorized) dampers are acceptable in buildings less than three stories in height above grade.
    - Exception: Ventilation systems serving unconditioned spaces.

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Interior Lighting Compliance Certificate

2006 IECC

Section 1: Project Information

Project Type: **Addition**
Project Title : Medical Center of Aurora - Cath #4

Construction Site:
1455 S. Potomac
Aurora, CO 80012

Owner/Agent:
Medical Center of Aurora
1455 S. Potomac
Aurora, CO 80012

Designer/Contractor:
Tyler Fritz
ccrd partners
8301 E. Prentice Ave
Suite 200
Greenwood Village, CO 80111
303.694.4755

Section 2: General Information

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Building Use Description by: **Activity Type**

Activity Type(s)	Floor Area
Hospital	912

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Section 3: Requirements Checklist

Interior Lighting:

☒ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
1094	889	YES

Controls, Switching, and Wiring:

☒ 2. Independent controls for each space (switch/occupancy sensor). ALL SPACES HAVE OCC. SENSORS + OVER-RIDE SWITCHES.
Exceptions:

Areas designated as security or emergency areas that must be continuously illuminated. VEST A100 DESIG. AS SECURITY

Lighting in stairways or corridors that are elements of the means of egress.

N/A ☐ 3. Master switch at entry to hotel/motel guest room.

N/A ☐ 4. Individual dwelling units separately metered.

☒ 5. Each space provided with a manual control to provide uniform light reduction by at least 50%.
Exceptions:

Only one luminaire in space;

An occupant-sensing device controls the area; ALL SPACES HAVE OCCUPANCY SENSING DEVICES

The area is a corridor, storeroom, restroom, public lobby or sleeping unit.

Areas that use less than 0.6 Watts/sq.ft.

☒ 6. Automatic lighting shutoff control in buildings larger than 5,000 sq.ft. VIA INDIVIDUAL OCC. SENSORS
Exceptions:

Sleeping units, patient care areas; and spaces where automatic shutoff would endanger safety or security.

N/A ☐ 7. Photocell/astronomical time switch on exterior lights.
Exceptions:

Lighting intended for 24 hour use.

☒ 8. Tandem wired one-lamp and three-lamp ballasted luminaires (No single-lamp ballasts).
Exceptions:

Electronic high-frequency ballasts; Luminaires on emergency circuits or with no available pair.

Section 4: Compliance Statement

Compliance Statement: The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2006 IECC requirements in COMcheck Version 3.6.1 and to comply with the mandatory requirements in the Requirements Checklist.

Tyler Fritz, PE - Electrical Engineer		
Name - Title	Signature	Date

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Interior Lighting Application Worksheet

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Section 1: Allowed Lighting Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Hospital	912	1.2	1094
		Total Allowed Watts =	1094

Section 2: Proposed Lighting Power Calculation

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Hospital (912 sq.ft.)				
Linear Fluorescent 1: EX-R: EXISTING 2X4 / 48" T8 32W / Electronic	3	8	85	680
Linear Fluorescent 2: A: 2X2 LENSED / 24" T8 17W / Electronic	3	1	45	45
Compact Fluorescent 1: B: 6" DOWNLIGHT / Triple 4-pin 32W / Electronic	1	4	32	128
Compact Fluorescent 2: C: 6" DOWNLIGHT, LENSED / Triple 4-pin 26W / Electronic	1	1	26	26
Incandescent 1: D: LED, IN-USE / Other	1	2	5	10
			Total Proposed Watts =	889

Section 3: Compliance Calculation

If the Total Allowed Watts minus the Total Proposed Watts is greater than or equal to zero, the building complies.

Total Allowed Watts =	1094
Total Proposed Watts =	889
Project Compliance =	205

Interior Lighting PASSES: Design 19% better than code.

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