



COMcheck Software Version COMcheckWeb  
**Interior Lighting Compliance Certificate**

**Project Information**

Energy Code: 2015 IECC  
 Project Title: 24057 - Residence at Veterans Park  
 Project Type: New Construction

Construction Site:    Owner/Agent:    Designer/Contractor:

**Additional Efficiency Package(s)**

Credits: 1.0 Required 1.0 Proposed  
 Reduced Lighting Power, 1.0 credit

**Allowed Interior Lighting Power**

<b>A</b> Area Category	<b>B</b> Floor Area (ft <sup>2</sup> )	<b>C</b> Allowed Watts / ft <sup>2</sup>	<b>D</b> Allowed Watts
1-Common Space Types:Lobby For Elevator	167	0.58	97
2-Common Space Types:Restrooms	108	0.88	95
3-Gymnasium/Fitness Center:Exercise Area	267	0.65	174
4-Common Space Types:Conference/Meeting/Multipurpose	620	1.11	688
5-Common Space Types:Corridor/Transition <8 ft wide	5163	0.59	3046
6-Common Space Types:Electrical/Mechanical	260	0.85	221
7-Common Space Types:Office - Enclosed	158	1.00	158
8-Common Space Types:Lobby - General	922	0.81	747
9-Common Space Types:Storage >=50 - <=1000 sq.ft.	259	0.57	148
10-Common Space Types:Stairwell	1056	0.62	655
Total Allowed Watts =			6028

**Proposed Interior Lighting Power**

<b>A</b> Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	<b>B</b> Lamps/ Fixture	<b>C</b> # of Fixture	<b>D</b> Fixture Watt.	<b>E</b> (C X D)
<u>1-Common Space Types:Lobby For Elevator</u>				
LED: L1: PENDANT: LED Other Fixture Unit 36W:	1	1	37	37
LED: L2: PENDANT: LED Other Fixture Unit 50W:	1	2	50	100
LED: G: TAPE LIGHT: LED Other Fixture Unit 36W:	1	1	37	37
<u>2-Common Space Types:Restrooms</u>				
LED: D2: DOWN LIGHT: LED Other Fixture Unit 16W:	1	2	16	32
LED: G: TAPE LIGHT: LED Other Fixture Unit 6.5W:	1	1	8	8
<u>3-Gymnasium/Fitness Center:Exercise Area</u>				
LED: D2: DOWN LIGHT: LED Other Fixture Unit 16W:	1	10	16	160
LED: G: TAPE LIGHT: LED Other Fixture Unit 60W:	1	1	69	69
<u>4-Common Space Types:Conference/Meeting/Multipurpose</u>				
LED: D2: DOWN LIGHT: LED Other Fixture Unit 16W:	1	19	16	304
<u>5-Common Space Types:Corridor/Transition &lt;8 ft wide</u>				

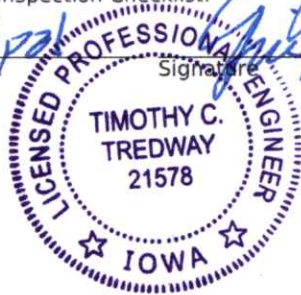
A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
LED: D2: DOWN LIGHT: LED Other Fixture Unit 16W:	1	94	16	1504
<u>6-Common Space Types:Electrical/Mechanical</u>				
LED: F: 4ft LINEAR: LED Linear 33W:	1	6	30	180
<u>7-Common Space Types:Office - Enclosed</u>				
LED: H: 1X4 SURFACE: LED Other Fixture Unit 36W:	1	4	35	140
<u>8-Common Space Types:Lobby - General</u>				
LED: D2: DOWN LIGHT: LED Other Fixture Unit 16W:	1	26	16	416
LED: G: TAPE LIGHT: LED Other Fixture Unit 80W:	1	1	73	73
Incandescent: J: SCONCE: Incandescent 60W:	1	2	60	120
<u>9-Common Space Types:Storage &gt;=50 - &lt;=1000 sq.ft.</u>				
LED: F: 4ft LINEAR: LED Linear 33W:	1	8	30	240
<u>10-Common Space Types:Stairwell</u>				
LED: O: STAIRWELL WALL LIGHT: LED Other Fixture Unit 40W:	1	12	40	480
Total Proposed Watts =				3900

Interior Lighting PASSES: Design 35% better than code

### Interior Lighting Compliance Statement

*Compliance Statement:* The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Tim Tredway - Principal  
Name - Title



Signature

01/31/25  
Date



# Exterior Lighting Compliance Certificate

## Project Information

Energy Code: 2015 IECC  
 Project Title: 24057 - Residence at Veterans Park  
 Project Type: New Construction  
 Exterior Lighting Zone: 2 (Residentially zoned area (LZ2))

Construction Site: Owner/Agent: Designer/Contractor:

## Allowed Exterior Lighting Power

A Area/Surface Category	B Quantity	C Allowed Watts /	D Tradable Wattage	E Allowed Watts (B X C)
Driveway	4582 ft2	0.06	Yes	275
Parking area	30338 ft2	0.06	Yes	1820
Walkway < 10 feet wide	562 ft of	0.7	Yes	393
Illuminated area of facade wall or surface	1848 ft2	0.1	No	185
Entry canopy	220 ft2	0.25	Yes	55
Main entry	3 ft of door	20	Yes	60
Special feature area	432 ft2	0.14	Yes	60
Total Tradable Watts (a) =				2664
Total Allowed Watts =				2849
Total Allowed Supplemental Watts (b) =				600

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.

(b) A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

## Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixture	D Fixture Watt.	E (C X D)
<u>Driveway (4582 ft2): Tradable Wattage</u>				
LED: R2: LED Roadway-Parking Unit 67W:	1	2	69	138
<u>Parking area (30338 ft2): Tradable Wattage</u>				
LED: R1: LED Roadway-Parking Unit 42W:	1	2	45	90
LED: R3: LED Roadway-Parking Unit 220W:	1	4	171	684
<u>Walkway &lt; 10 feet wide (562 ft of walkway length): Tradable Wattage</u>				
LED: W: LED Other Fixture Unit 16W:	1	4	20	80
<u>Illuminated area of facade wall or surface (1848 ft2): Non-tradable Wattage</u>				
LED: N1: UP/DOWN SCONCE: LED Other Fixture Unit 80W:	1	10	36	360
LED: N2: UP SCONCE: LED Other Fixture Unit 16W:	1	4	18	72
<u>Entry canopy (220 ft2): Tradable Wattage</u>				
LED: M: DOWN LIGHT: LED Other Fixture Unit 13W:	1	7	10	70
<u>Main entry (3 ft of door width): Tradable Wattage</u>				
LED: C: UP/DOWN SCONCE: LED Other Fixture Unit 40W:	1	2	40	80
<u>Special feature area (432 ft2): Tradable Wattage</u>				

**A**

**Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast**

**B                      C                      D                      E**

**Lamps/                      # of                      Fixture                      (C X D)**

**Fixture                      Fixture                      Watt.**

LED: A: TREE LIGHT: LED Other Fixture Unit 25W:

1                      6                      21                      126

Total Tradable Proposed Watts =                      1268

**Exterior Lighting PASSES: Design 58% better than code**

**Exterior Lighting Compliance**

**Statement**

*Compliance Statement:* The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2015 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Manual.

*Tim Tredway - Principal*

Name - Title



Signature

*01/31/25*

Date





**COMcheck Software Version COMcheckWeb**  
**Mechanical Compliance Certificate**

**Project Information**

Energy Code: 2015 IECC  
 Project Title: 24057 - Residence at Veterans Park  
 Location: Knoxville, Iowa  
 Climate Zone: 5a  
 Project Type: New Construction

Construction Site: \_\_\_\_\_ Owner/Agent: \_\_\_\_\_ Designer/Contractor: \_\_\_\_\_

**Additional Efficiency Package(s)**

Credits: 1.0 Required 1.0 Proposed  
 Reduced Lighting Power, 1.0 credit

**Mechanical Systems List**

**Quantity System Type & Description**

- 1 HP-3/BC-3 (Single Zone):  
 Split System Heat Pump  
 Heating Mode: Capacity = 35 kBtu/h,  
 Proposed Efficiency = 9.00 HSPF, Required Efficiency = 8.20 HSPF  
 Cooling Mode: Capacity = 24 kBtu/h,  
 Proposed Efficiency = 16.00 SEER, Required Efficiency = 14.00 SEER  
 Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00  
 Fan System: FAN SYSTEM 1 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes  
  
 Fans:  
 FAN 1 Supply, Single-Zone VAV, 1130 CFM, 0.5 motor nameplate hp, 0.0 fan efficiency grade, 0.0 total fan efficiency, 0.0 design fan efficiency , fan exception: Single fan <= 5HP
  
- 3 HP-2/BC-1 (Single Zone):  
 Split System Heat Pump  
 Heating Mode: Capacity = 23 kBtu/h,  
 Proposed Efficiency = 9.00 HSPF, Required Efficiency = 8.20 HSPF  
 Cooling Mode: Capacity = 23 kBtu/h,  
 Proposed Efficiency = 16.00 SEER, Required Efficiency = 14.00 SEER  
 Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00  
 Fan System: FAN SYSTEM 2 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes  
  
 Fans:  
 FAN 2 Supply, Single-Zone VAV, 715 CFM, 0.3 motor nameplate hp, 0.0 fan efficiency grade, 0.0 total fan efficiency, 0.0 design fan efficiency , fan exception: Single fan <= 5HP
  
- 1 Water Heater:  
 Electric Storage Water Heater, Capacity: 20 gallons w/ Circulation Pump  
 No minimum efficiency requirement applies

**Mechanical 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 2015 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Tim Tredway - Principal \_\_\_\_\_ 01/31/25  
 Name - Title \_\_\_\_\_ Date





# Inspection Checklist

Energy Code: 2015 IECC

Requirements: 98.0% were addressed directly in the COMcheck software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2] <sup>1</sup>	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR3] <sup>1</sup>	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufacturer's sizing guide.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR4] <sup>1</sup>	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include interior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C103.2 [PR8] <sup>1</sup>	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided should include exterior lighting power calculations, wattage of bulbs and ballasts, transformers and control devices.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.6 [PR16] <sup>1</sup>	Group R-2 dwelling units have separate electrical meters.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C406 [PR9] <sup>1</sup>	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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**Additional Comments/Assumptions:**

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.2.4.5, C403.2.4.6 [FO9] <sup>3</sup>	Snow/ice melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.

**Additional Comments/Assumptions:**

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6] <sup>3</sup>	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.6.1, C404.6.2 [PL3] <sup>1</sup>	Automatic time switches installed to automatically switch off the recirculating hot-water system or heat trace.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C404.6.3 [PL7] <sup>3</sup>	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C404.7 [PL8] <sup>3</sup>	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving a signal from the action of a user of a fixture or appliance and limits the temperature of the water entering the cold-water piping to 104°F.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.

**Additional Comments/Assumptions:**

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41] <sup>3</sup>	Thermally ineffective panel surfaces of sensible heating panels have insulation $\geq$ R-3.5.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	
C403.2.13 [ME71] <sup>2</sup>	Unenclosed spaces that are heated use only radiant heat.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.6.1 [ME59] <sup>1</sup>	Demand control ventilation provided for spaces $>500$ ft <sup>2</sup> and $>25$ people/1000 ft <sup>2</sup> occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow $>3,000$ cfm.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.6.2 [ME115] <sup>3</sup>	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.7 [ME57] <sup>1</sup>	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.8 [ME116] <sup>3</sup>	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.9 [ME60] <sup>2</sup>	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.9 [ME10] <sup>2</sup>	Ducts and plenums sealed based on static pressure and location.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.9.1.3 [ME11] <sup>3</sup>	Ductwork operating $>3$ in. water column requires air leakage testing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.4.2.3.2.2 [ME122] <sup>3</sup>	Open- or closed circuit cooling towers have a separate heat exchanger to isolate the cooling tower from the heat pump loop, and heat loss is controlled by shutting down the circulation pump on the cooling tower loop.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.4.4.6 [ME110] <sup>3</sup>	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply. <i>See the Mechanical Systems list for values.</i>
C408.2.2.1 [ME53] <sup>3</sup>	Air outlets and zone terminal devices have means for air balancing.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

1 High Impact (Tier 1)    2 Medium Impact (Tier 2)    3 Low Impact (Tier 3)



Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.5, C403.5.1, C403.5.2 [ME123] <sup>3</sup>	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.5.1 and refrigeration compressor systems that comply with C403.5.2..	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.

**Additional Comments/Assumptions:**

1 High Impact (Tier 1)	2 Medium Impact (Tier 2)	3 Low Impact (Tier 3)
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Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.2.1 [EL15] <sup>1</sup>	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Lighting that is related to means of egress in stairways, ramps, corridors, or emergency routes.
C405.2.1 [EL18] <sup>1</sup>	Occupancy sensors installed in required spaces.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.1, C405.2.2.3 [EL23] <sup>2</sup>	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Areas such as security or emergency areas that need continuous lighting.
C405.2.2.1 [EL22] <sup>2</sup>	Automatic controls to shut off all building lighting installed in all buildings.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Lighting that is related to means of egress in stairways, ramps, corridors, or emergency routes.
C405.2.3 [EL16] <sup>2</sup>	Daylight zones provided with individual controls that control the lights independent of general area lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.2.3.1, C405.2.3.2 [EL20] <sup>1</sup>	Primary sidelighted areas are equipped with required lighting controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.2.3.1, C405.2.3.3 [EL21] <sup>1</sup>	Enclosed spaces with daylight area under skylights and rooftop monitors are equipped with required lighting controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C405.2.4 [EL4] <sup>1</sup>	Separate lighting control devices for specific uses installed per approved lighting plans.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.4 [EL8] <sup>1</sup>	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.2.5 [EL25] <sup>null</sup>	Automatic lighting controls for exterior lighting installed. Controls will be daylight controlled, set based on business operation time-of-day, or reduce connected lighting > 30%.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.3 [EL6] <sup>1</sup>	Exit signs do not exceed 5 watts per face.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

**Additional Comments/Assumptions:**

1	High Impact (Tier 1)	2	Medium Impact (Tier 2)	3	Low Impact (Tier 3)
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Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.2 [FI17] <sup>3</sup>	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C303.3, C408.2.5.3 [FI8] <sup>3</sup>	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.2 [FI27] <sup>3</sup>	HVAC systems and equipment capacity does not exceed calculated loads.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1 [FI47] <sup>3</sup>	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1.1 [FI42] <sup>3</sup>	Heat pump controls prevent supplemental electric resistance heat from coming on when not needed.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1.2 [FI38] <sup>3</sup>	Thermostatic controls have a 5 °F deadband.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.1.3 [FI20] <sup>3</sup>	Temperature controls have setpoint overlap restrictions.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.2 [FI39] <sup>3</sup>	Each zone equipped with setback controls using automatic time clock or programmable control system.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	<b>Exception:</b> Requirement does not apply.
C403.2.4.2.1, C403.2.4.2.2 [FI40] <sup>3</sup>	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C403.2.4.2.3 [FI41] <sup>3</sup>	Systems include optimum start controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.3 [FI11] <sup>3</sup>	Heat traps installed on supply and discharge piping of non-circulating systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C404.4 [FI25] <sup>2</sup>	All piping insulated in accordance with section details and Table C403.2.10.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

1 High Impact (Tier 1)
  2 Medium Impact (Tier 2)
  3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C404.6.1 [FI12] <sup>3</sup>	Controls are installed that limit the operation of a recirculation pump installed to maintain temperature of a storage tank. System return pipe is a dedicated return pipe or a cold water supply pipe.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C405.4.1 [FI18] <sup>1</sup>	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Interior Lighting fixture schedule for values.
C405.5.1 [FI19] <sup>1</sup>	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	See the Exterior Lighting fixture schedule for values.
C408.2.1 [FI28] <sup>1</sup>	Commissioning plan developed by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.3.1 [FI31] <sup>1</sup>	HVAC equipment has been tested to ensure proper operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.3.2 [FI10] <sup>1</sup>	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.4 [FI29] <sup>1</sup>	Preliminary commissioning report completed and certified by registered design professional or approved agency.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.1 [FI7] <sup>3</sup>	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.1 [FI16] <sup>3</sup>	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.3 [FI43] <sup>1</sup>	An air and/or hydronic system balancing report is provided for HVAC systems.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.2.5.4 [FI30] <sup>1</sup>	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.
C408.3 [FI33] <sup>1</sup>	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	<input type="checkbox"/> Complies <input type="checkbox"/> Does Not <input type="checkbox"/> Not Observable <input type="checkbox"/> Not Applicable	Requirement will be met.

**Additional Comments/Assumptions:**

1 High Impact (Tier 1)
  2 Medium Impact (Tier 2)
  3 Low Impact (Tier 3)



# ENERGY STAR Multifamily New Construction

## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

### HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each building which includes system design for all unique unit plans and common spaces. For projects with multiple buildings, one National HVAC Design Report per building or per project is permitted. <sup>1</sup>
- Obtain efficiency features (e.g., window performance, insulation levels, and infiltration rate) from the builder, architect, or Rater. <sup>2</sup>
- Provide the completed National HVAC Design Report to the Rater and the person / company completing the National HVAC Functional Testing Checklist. <sup>2</sup>

### 1. Design Overview

1.1 Designer name: Tim Tredway Designer company: LST Consulting Engineers Date: 01/27/2025  
 1.2 Select which party you are providing these design services to:  Builder / Developer  FT Agent  MEP / Credentialed HVAC contractor  
 1.3 Name of company you are providing these design services to (if different than Item 1.1): Overland Property Group  
 1.4 Building address: 1515 West Pleasant Street City: Knoxville State: IA Zip code: 50138

### 2a. Dwelling Unit & Common Space Mechanical Ventilation Design ("Vent System") <sup>3</sup> & Inlets in Return Duct <sup>4, 5, 6</sup>

Designer Verified

#### Airflow:

- 2.1 Dwelling unit ventilation airflow design rate & run-time meet the requirements of Section 4 of ASHRAE 62.2 <sup>7</sup> – 2013  
 Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%.<sup>8</sup>
- 2.2 Common space outdoor airflow design rate meet the requirements of Section 6 of ASHRAE 62.1 <sup>9, 10</sup> – 2013  
 ERI and Prescriptive Path Only: Rates shall not exceed 2013 rates by more than 50%.
- 2.3 Access points to measure airflow rate and inspect outdoor air dampers are provided and accessible by the Rater. <sup>2, 11</sup>

List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right: <sup>12</sup>	1-Bed	2-Bed				
2.4 # of bedrooms:	1	2				
2.5 Square footage:	605	772				
2.6 Ventilation airflow rate required by ASHRAE 62.2:	33.2	45.7				
2.7 Ventilation airflow rate designed:	35	50				
2.7.1 If applicable, run-time per cycle (minutes):	N/A	N/A				
2.7.2 If applicable, cycle time (minutes):	N/A	N/A				
List common space for which 62.1 ventilation rates were calculated in the spaces to the right: <sup>11, 12, 13</sup>	Fitness	Lobby	1st Floor Hall	2nd Floor Hall	3rd Floor Hall	Multi Purpos
2.8 Ventilation airflow required by ASHRAE 62.1 (CFM): <sup>10</sup>	55	8	90	131	125	138
2.9 Ventilation airflow designed (CFM): <sup>10</sup>	55	10	90	135	125	140

#### System Type & Controls:

List Ventilation System ID in the spaces to the right: <sup>12</sup>	EF-1	EF-2	EF-3	EF-4		
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)	Exhaust Fan	Exhaust Fan	Exhaust Fan	Exhaust Fan		
2.11 Manufacturer:	Panosonic	Panosonic	Panosonic	Panosonic		
2.12 Model Number:	FV-0810VSS1	FV-0810VSS1	FV-0810VSS1	FV-0511VK2		
2.13 # installed in the building:	2	48	1	48		
2.14 Spaces each fan serves (i.e., single, multiple)	Single	Single	Single	Single		
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)	Restrooms	Unit Bathroom	Janitor	Unit Kitchen		
2.16 Specified control location: (e.g., Master bath, utility):	Restroom	Bathroom	Janitor	Kitchen		

- 2.17 Specified controls allow the systems to operate automatically, without occupant intervention. A ventilation override control is specified and also labeled if its function is not obvious (e.g., a label is required for a toggle wall switch, but not for a switch that's on the ventilation equipment). In townhouses only, this control must be readily accessible to the occupant. In all other multifamily dwelling units, the override control is not required to be readily accessible to the occupant. However, in such cases, EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.
- 2.18 For any outdoor air inlet designed to connect to the dwelling unit HVAC system, specified controls automatically restrict airflow using a motorized damper during ventilation off-cycle and occupant override. <sup>6, 13</sup>   N/A

#### Sound:

- 2.19 If located in the dwelling unit, the fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 2 sones if continuous, or exempted. <sup>15</sup>   N/A

#### Efficiency:

- 2.20 If dwelling-unit Vent System controller operates the dwelling unit HVAC fan, then HVAC fan operation is intermittent and either the fan type in Item 4.12 is ECM / ICM, or the controls will reduce the run-time by accounting for HVAC system is heating or cooling hours. <sup>16</sup>   N/A
- 2.21 If in-unit bathroom fans or in-line fans are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are ENERGY STAR certified. <sup>17</sup>   N/A



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## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

2.22 If central exhaust fans, ≤ 1 HP, are specified as part of the Dwelling Unit Mechanical Ventilation System, then they are direct-drive, ECM, with variable speed controllers. If > 1 HP, they are specified to meet or exceed [efficiency standards for NEMA Premium™](#) Motors. <sup>18</sup>   N/A

**Air Inlet Locations:** (Complete this section if system has specified air inlet location(s); otherwise check "N/A".) <sup>19</sup>   Designer Verified  
 N/A

2.23 Inlet(s) pull ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.

2.24 Inlet(s) are ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from dryer exhausts and sources exiting the roof. <sup>20</sup>

2.25 Inlet(s) are provided with rodent / insect screen with ≤ 0.5 inch mesh.

**2b. Dwelling Unit Local Mechanical Exhaust Design** – System(s) are designed that mechanically exhaust air from each dwelling unit kitchen and bathroom directly to the outdoors or to ventilation risers and meet the continuous and/or intermittent rates. <sup>21</sup>

Location		Continuous Rate	Intermittent Rate <sup>22</sup>	Exhaust Fan Type
Kitchen	Airflow	≥ 5 ACH, based on kitchen volume <sup>23, 24, 25</sup> (Alternative in Fn. 23)	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume <sup>23, 24, 25, 26</sup>	<input type="checkbox"/> Continuous <input checked="" type="checkbox"/> Intermittent <input checked="" type="checkbox"/> In-unit fan
	Sound	Recommended if in-unit: ≤ 1 sone	Recommended if in-unit: ≤ 3 sones	<input type="checkbox"/> Central / shared fan
Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM	<input type="checkbox"/> Continuous <input checked="" type="checkbox"/> Intermittent <input checked="" type="checkbox"/> In-unit fan
	Sound	Required if in-unit: ≤ 2 sones	Recommended if in-unit: ≤ 3 sones	<input type="checkbox"/> Central / shared fan

**2c. Common Space and Garage Minimum Exhaust Rates** – System(s) are designed that mechanically exhaust air from each common space, as required by ASHRAE 62.1-2010 (or later).

Location	ASHRAE 62.1 Rate	Design Rate	Location	ASHRAE 62.1 Rate	Design Rate
Janitor Room	1 cfm/ft <sup>2</sup>	95 CFM	Common space kitchen <sup>27</sup>	50 cfm / 100 cfm	N/A
Trash / Recycling Room	1 cfm/ft <sup>2</sup>	N/A	Common space bathroom <sup>28</sup>	50 cfm per toilet / urinal	50 CFM
Parking Garage	0.05 cfm/ft <sup>2</sup> , standby 0.75 cfm/ft <sup>2</sup> , full-on	N/A	<input type="checkbox"/> Shared garage exhaust fan controls include CO and NO2 sensors.		

### 3. Heating & Cooling Loads

**Dwelling Unit Heating & Cooling Loads** (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces.)<sup>29</sup>  N/A

3.1 Loads calculated using:  Unabridged ACCA Manual J v8  2013 / 2017 ASHRAE Fundamentals  ASHRAE 183  Other per AHJ <sup>30</sup>  
Townhouses only: Loads must be calculated room-by-room.

3.2 Check one box only to indicate whether the Dwelling Unit Loads is unit-specific or represents the design of more than one unit: <sup>31</sup>  
 Unit-specific design  Group design <sup>32</sup> \_\_\_\_ total groups for this building, representing \_\_\_\_ units.

Worst-case design (If the top floor unit with the greatest CFA and window area results in total heat gain <18 kBtuh, it may represent all other units if cooling system selected for all is single-speed & <20 kBtuh or two-speed / variable-speed & <25 kBtuh.)

3.3 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling.

3.4 Outdoor design temperatures used in loads: (See Footnote 33 and [www.energystar.gov/hvacdesigntemps](http://www.energystar.gov/hvacdesigntemps).) <sup>31</sup>  
County & State, or US Territory selected: MARIION CO, IOWA Cooling season: <sup>91</sup> \_\_\_\_ °F Heating season: <sup>5</sup> \_\_\_\_ °F

List the unit plan for which Loads were calculated: <sup>12</sup>	2 - Bed							
3.5 Location of Unit: top, mid, bottom, corner, interior	Top							
3.6 Number of occupants used in loads: <sup>31, 34</sup>	3							
3.7 Total occupant gains (Btuh): <sup>31</sup>	1200							
3.8 Conditioned floor area used in loads: <sup>31, 35</sup>	772							
3.9 Window area used in loads: <sup>31, 36</sup>	66							
3.10 Predominant window SHGC used in loads: <sup>31, 37</sup>	..27							
3.11 Infiltration (ACH / ACH50 / CFM) used in loads: <sup>38</sup>	0							
3.12 Mechanical ventilation (CFM) used in loads: <sup>31</sup>	50							
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): <sup>31</sup>	4430							
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): <sup>32</sup>	N							
3.15 Sensible Heat Gain At Design Conditions (kBtuh): <sup>31</sup>	10,848							
3.16 Latent Heat Gain At Design Conditions (kBtuh):	1,182							
3.17 Total Heat Gain at Design Conditions (kBtuh): <sup>31</sup>	12,030							
3.18 Total Heat Loss at Design Conditions (kBtuh):	7,925							





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<b>3.19 Common Space Heating &amp; Cooling Loads</b> <sup>12</sup> (required for all common space heating and cooling systems)							<b>Designer Verified</b>
							<input type="checkbox"/> N/A
Common Space Name: <u>1st Floor Internal</u>	Design Conditions: Total Heat Gain: <u>16,540</u> (kBtuh)		Total Heat Loss: <u>13,926</u> (kBtuh)				
Common Space Name: <u>1st Floor External</u>	Design Conditions: Total Heat Gain: <u>25,310</u> (kBtuh)		Total Heat Loss: <u>20,090</u> (kBtuh)				
Common Space Name: <u>2nd Floor Common</u>	Design Conditions: Total Heat Gain: <u>13,565</u> (kBtuh)		Total Heat Loss: <u>11,520</u> (kBtuh)				
<b>3.20 Building Heating &amp; Cooling Loads</b> <sup>12</sup> (only required when shared systems such as central boilers or chillers are specified.) <input checked="" type="checkbox"/> N/A							
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)		Total Heat Loss: _____ (kBtuh)				
System Name: _____	Design Conditions: Total Heat Gain: _____ (kBtuh)		Total Heat Loss: _____ (kBtuh)				
<b>4. Heating &amp; Cooling Equipment Selection</b>							
4.1 Equipment selected per <input type="checkbox"/> ACCA Manual S, or where not applicable, <input checked="" type="checkbox"/> Other: _____ . (See Footnote 39)							<input checked="" type="checkbox"/>
4.2 Prescriptive Path: Equipment serving dwelling units, common spaces, and garages meet the efficiency levels specified in the Exhibit X of the National Rater Field Checklist. Electric resistance space heating is not specified in dwelling units. <sup>40</sup>							<input checked="" type="checkbox"/> <input type="checkbox"/> N/A
4.3 ERI Path: Equipment serving common spaces and garages but not serving dwelling units meet the efficiency levels specified in the Exhibit X of the National Rater Field Checklist. Also see Exhibit X for restrictions on electric space resistance. <sup>40</sup>							<input checked="" type="checkbox"/> <input type="checkbox"/> N/A
<b>Cooling Equipment</b> <sup>12</sup> (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) <input type="checkbox"/> N/A							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:	HP-2	HP-2	HP-3	HP-1	HP-1	HP-3	
4.4 Equipment type: (e.g., PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	
4.5 Area / Space(s) that system serves:	Units	1st Fl. Int.	1st Fl. Ext.	2nd Fl. Com.	3rd Fl. Commons	3rd Fl. Multi Purp	
4.6 Chiller / condenser / outdoor unit manufacturer:	TRANE	TRANE	TRANE	TRANE			
4.7 Chiller / condenser / outdoor unit model #:	4TWR6024N1	4TWR6024N	4TWR6036N1	4TWR6018N1			
4.8 Evaporator / indoor unit manufacturer:	TRANE	TRANE	TRANE	TRANE			
4.9 Evaporator / indoor unit model #:	TEM6A0B24H21	TEM6A0B24	TEM6A0C36H3	TEM6A0B24H2			
4.10 AHRI reference #: <sup>41</sup>	209068070	209068070	209068076	210426144			
4.11 Rated efficiency:	15.80 SEER2	15.80 SEER2	16.00 SEER2	15.20 SEER2			
4.12 Evaporator fan type: PSC, ECM / ICM, Other							
4.13 Compressor speed: Single, Two, Variable	TWO	TWO	TWO	SINGLE			
4.14 Turn down ratio (for variable speed equipment):	N/A	N/A	N/A	N/A			
4.15 Latent capacity at design conditions (kBtuh): <sup>42</sup>	4,500	5,400	8,000	3100			
4.16 Sensible capacity at design conditions (kBtuh): <sup>42</sup>	17,000	17,600	26,800	11,100			
4.17 Total capacity at design conditions (kBtuh): <sup>42</sup>	21,500	23,000	34,800	14,200			
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5: <sup>29</sup>	178%	139%	138%	105%	100%	139%	
4.19 Meets cooling sizing limit: (see below for A, B, C, D or N/A) <sup>29, 31</sup>	D	A		A	A		
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): <sup>43</sup>	N/A	N/A		N/A	N/A		
4.21 If "B", calculate HDD / CDD ratio: <sup>43</sup>	N/A	N/A		N/A	N/A		
Equipment Type & Climate Condition	<b>Compressor Type (Per Item 4.13)</b>						
	Single-Speed	Two-Speed		Variable-Speed			
A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate <sup>43</sup>	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%		Recommended: 90 – 130% Allowed: 90 – 160%			
B: For Cooling Mode of Heat Pump in Condition B Climate <sup>43</sup>	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh		90% - 100%, plus 15 kBtuh			
C: For low-load spaces (≤15 kBtuh) <sup>44</sup>	≤ 20 kBtuh						
D: For low-load spaces (≤18 kBtuh) <sup>44</sup>	≤ 25 kBtuh			≤ 25 kBtuh			



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Heating Equipment <sup>12</sup> (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".)							Designer Verified
							<input type="checkbox"/> N/A
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:	HP-2	HP-2	HP-3	HP-1	HP-1	HP-3	
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance	ASHP	ASHP	ASHP	ASHP	ASHP	ASHP	
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace	N/A	N/A	N/A	N/A	N/A	N/A	
4.24 Area / Space(s) that system serves:	Units	1st Fl. Int.	1st Fl. Ext.	2nd Fl. Com.	3rd Fl. Commons	3rd Fl. Multi Purp	
4.25 Manufacturer:	TRANE	TRANE	TRANE	TRANE			
4.26 Model Number:	4TWR6024N1	4TWR6024N1	4TWR6036N1	4TWR6018N1			
4.27 AHRI reference #: <sup>41</sup>	209068070	209068070	209068076	210426144			
4.28 Rated efficiency:	7.50 HSPF2	7.50 HSPF2	7.80 HSPF2	7.80 HSPF2			
4.29 Equipment output capacity (kBtuh): <sup>45</sup>	25,100	25,100	34,600	19,000			
4.30 Air-source heat pump output capacity (17°F) (kBtuh):	15,700	15,700	21,900	14,400			
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent <sup>46</sup>	N/A	N/A	N/A	N/A			
4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24: <sup>29</sup>	N/A	N/A	N/A	N/A			
4.33 Meets furnace sizing limit: (see below for A, B, C, or N/A) <sup>29</sup>	N/A	N/A	N/A	N/A			
A: For low-load spaces ( $\leq 10$ kBtuh), furnace output capacity is $\leq 40$ kBtuh							
B: When Used for Heating Only			C: When Paired With Cooling				
100 – 400%			Recommended: 100 – 140%    Allowed: 100 – 400%				
<b>Equipment Controls</b>							
4.34 All equipment controls below have been included where applicable in the HVAC Design.							<input checked="" type="checkbox"/>
4.35 All heating and cooling systems serving a dwelling unit shall have thermostatic controls within the dwelling unit.							
4.35.1 Prescriptive Path: Dwelling unit thermostats are programmable.							
4.36 Stair and elevator shaft vents shall be equipped with motorized dampers that are capable of being automatically closed during normal building operation and are interlocked to open as required by fire and smoke detection systems.							
4.37 Freeze protection systems, such as heat tracing of piping and heat exchangers, including self-regulating heat tracing, and garage / plenum heaters shall include automatic controls capable of shutting off the systems when pipe wall or garage / plenum temperatures are above 40°F. Where heat tracing is specified for freeze protection, controls must be based on pipe wall temperature and a minimum of R-3 pipe insulation is also required.							
4.38 Snow- and ice-melting systems shall include automatic controls capable of shutting off the systems when the pavement temperature is above 50°F and no precipitation is falling, and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40°F so that the potential for snow or ice accumulation is negligible.							
<b>Hydronic Distribution Requirements – Applies to heating or cooling systems serving more than one dwelling unit</b>							<input checked="" type="checkbox"/> N/A
4.39 All hydronic distribution requirements below have been included where applicable in the HVAC Design.							<input type="checkbox"/>
4.40 All terminal heating and cooling distribution equipment must be separated from the riser or distribution loop by a control valve or terminal distribution pump, so that heated or cooled fluid is not delivered to the dwelling unit distribution equipment when there is no call from the thermostat.							
4.41 Terminal units must be equipped with pressure independent balancing valves or pressure independent control valves.							
4.42 Piping of a heating or cooling system (e.g., steam, hot or chilled water, brine, refrigerant) shall be thermally insulated in accordance with ASHRAE 90.1-2007, Table 6.8.3. Construction documents must account for piping total thickness including required insulation when passing through planks or any other penetrations and shall specify that the piping must be inspected before access is covered up: Heating System: Pipe size: ___ inches    Insulation thickness: ___ inches    Pipe size: ___ inches    Insulation thickness: ___ inches Cooling System: Pipe size: ___ inches    Insulation thickness: ___ inches    Pipe size: ___ inches    Insulation thickness: ___ inches							
4.43 For circulating pumps serving hydronic heating or cooling systems with three-phase motors, 1 horse-power or larger, motors shall meet or exceed <a href="#">efficiency standards for NEMA Premium</a> ™ motors. If 5 horse-power or larger, must also be specified with variable frequency drives.							
4.44 If a variable speed pumping system is installed, system designed to prevent "dead-heading" and a method of water flow bypass is provided, such as a minimum flow bypass valve or 3-way valves on specific terminal units.							
4.45 For shared boilers, chillers, and cooling towers, temperature and pressure gauges, air eliminator, expansion tank, and check valves are clearly shown on the drawings. A complete sequence of operations for all systems indicating recommendations for all setpoints is provided. For condensing boilers, design return temperature is indicated and system is designed to return water at a temperature that enables condensing.							



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<b>5. Dwelling Unit Duct Design</b> (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A".)				<b>Designer Verified</b>
				<input type="checkbox"/> N/A
5.1 Duct system designed for the equipment selected in Section 4, per <input type="checkbox"/> ACCA Manual D <input checked="" type="checkbox"/> Other: _____ Townhouses only: Duct system must be designed per ACCA Manual D.				<input checked="" type="checkbox"/>
5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). <sup>12, 47, 48</sup>				
Name of the unit plan: 2-BED UNIT		Name of the unit plan:		
Design HVAC fan airflow: <sup>49</sup> Cooling mode <u>715</u> CFM Heating mode <u>715</u> CFM		Design HVAC fan airflow: <sup>49</sup> Cooling mode _____ CFM Heating mode _____ CFM		
Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup> Cooling mode <u>MED</u> Heating mode <u>MED</u>		Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup> Cooling mode _____ Heating mode _____		
Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> <u>0.50</u> IWC		Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> _____ IWC		
Room Name		Design Airflow (CFM)		Room Name
1	Kitchen	120	1	
2	Living Room	250	2	
3	Bedroom 1	135	3	
4	Bedroom 2	135	4	
5	Bathroom	40	5	
6	Laundry/Hall	35	6	
7			7	
8			8	
9			9	
10			10	
Total for all rooms		715	Total for all rooms	
			0	
<b>6. Duct Quality Installation – Applies to Heating, Cooling, Ventilation, Exhaust, &amp; Pressure Balancing Ducts, Unless Noted in Footnote</b>				
6.1 Applicable duct quality installation requirements in 6.2 – 6.8 below have been included in the HVAC Design.				<input checked="" type="checkbox"/>
6.2 Ductwork specified without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. <sup>52</sup>				
6.3 All supply and return ducts not in conditioned space, including connections to trunk ducts, are insulated to $\geq$ R-6. <sup>53</sup>				
6.3.1 Prescriptive Path: Dwelling unit ductwork meets the location and insulation requirements specified in the ENERGY STAR MF Reference Design.				
<b>Dwelling Unit</b>				
6. MERV 6+ filter(s) specified for each ducted mechanical System serving an individual dwelling unit, designed so all return and mechanically supplied outdoor air passes through filter(s) prior to conditioning, and located to facilitate access & regular service by the occupant, building owner, or building maintenance staff. Filter access panel specified with a gasket or comparable sealing mechanism.				
6.5 Ductwork air-sealing specified such that Rater-measured total duct leakage is $\leq$ 4 CFM25 per 100 ft <sup>2</sup> of CFA at rough-in or $\leq$ 8 CFM25 per 100 ft <sup>2</sup> at final, or if there are no ducted returns, $\leq$ 3 CFM25 per 100 ft <sup>2</sup> of CFA at rough-in or $\leq$ 6 CFM25 per 100 ft <sup>2</sup> at final. <sup>54</sup> Additionally, for Townhouses only, Rater-measured duct leakage to the outside is $\leq$ 4 CFM25 per 100 ft <sup>2</sup> of CFA or $\leq$ 40 CFM25. <sup>55</sup>				
6.6 All bedrooms provided with transfer grilles, jump ducts, dedicated return ducts, and/or undercut doors. Bedrooms with a design supply airflow $\geq$ 150 CFM (as reported in Item 5.2) are specified to achieve a Rater-measured pressure differential $\geq$ - 5 Pa and $\leq$ 5 Pa with respect to the main body of the dwelling unit when all air handlers are operating. Townhouses only: In addition, bedrooms with a design supply airflow < 150 CFM are specified to achieve a Rater-measured pressure differential $\geq$ - 3 Pa and $\leq$ +3 Pa.				
<b>Common Space and Central Exhaust</b>				
6.7 Duct design specifies that all supply, return, and exhaust ductwork and all plenums serving common spaces shall be sealed at all transverse joints, longitudinal seams, and duct wall penetrations.				
6.8 Central exhaust systems (that serve four or more dwelling units): Ductwork air-sealing specified such that measured duct leakage does not exceed 25% of exhaust fan flow at rough-in (e.g., including trunks, branches, and take-offs) or 30% of exhaust fan flow at final (e.g., inclusive of all ductwork between the fan and the grilles). <sup>56</sup>				



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### Footnotes:

1. This report shall represent system design for all unique unit plans, common spaces, and where applicable, parking garages. The term 'common space' refers to any spaces in the building being certified that serve a function in support of the residential part of the building that is not part of a dwelling or sleeping unit. This includes spaces used by residents, such as corridors, stairs, lobbies, laundry rooms, exercise rooms, residential recreation rooms, and dining halls, as well as offices and other spaces used by building management, administration or maintenance in support of the residents. As an alternative, for dwelling units, designers may instead choose to complete a Single-Family New Homes National HVAC Design Report for each unique unit plan, if room-by-room loads are calculated using Unabridged ACCA Manual J v8. Sections 4 and 5 must be completed in either Design Report unless exempted by this Report. All other systems, including all systems serving common spaces, must be documented in this Design Report. This report is designed to meet ASHRAE 62.1-2010 or later, ASHRAE 62.2-2010 or later, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new multifamily buildings when compared to multifamily buildings built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, system designs documented through the use of this report are not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, as defined by ANSI / RESNET / IECC 301, or an equivalent designation as determined by a Home Certification Organization (HCO) or Multifamily Review Organization (MRO); and, b) have attended and successfully completed an EPA-recognized training class. See [www.energystar.gov/mftraining](http://www.energystar.gov/mftraining).
3. As defined by ANSI / RESNET / ICC 301-2019, a Dwelling Unit Mechanical Ventilation System is a ventilation system consisting of powered ventilation equipment such as motor-driven fans and blowers and related mechanical components such as ducts, inlets, dampers, filters and associated control devices that provides dwelling-unit ventilation at a known or measured airflow rate.
4. The dwelling-unit mechanical ventilation system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of a dwelling-unit mechanical ventilation system. Designers may provide supplemental documentation as needed to document the system design. For example, for Item 2.7, designers are permitted to provide multiple combinations of a design ventilation airflow rate, run-time per cycle, and cycle time. When multiple combinations are provided, the Rater will be required to first assess the run-time setting of the installed system and use that to determine the corresponding design ventilation rate. The Rater-measured ventilation rate then must fall within the program-specified tolerance relative to that design ventilation rate.
5. In "Warm-Humid" climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at  $\leq 60\%$ .
6. Item 2.18 applies to any outdoor air inlet connected to the dwelling unit HVAC system, regardless of its intended purpose (e.g., for ventilation air, make-up air, combustion air). For example, if an outdoor air inlet connected to a ducted return is used as a dedicated source of outdoor air for an exhaust ventilation system (e.g., bath fan), the outdoor airflow must be automatically restricted when the exhaust fan is not running and in the event of an override of the exhaust ventilation system.  

In dwelling / sleeping units in multifamily buildings, but not townhouses, automatic restriction of airflow is exempted if a manual shutoff damper is used with a continuous exhaust ventilation system and is readily-accessible, labeled as the override, and not used as a balancing damper.

Note that a Rater will generally measure the ventilation rate at the highest HVAC fan speed applicable to ventilation mode (e.g., if the inlet only opens when the HVAC is in 'fan-only' mode, then test in this mode) to verify that it is  $\leq 15$  CFM or 15% above design value. If the inlet has a motorized damper that only opens when the local mechanical kitchen exhaust is turned on, then testing is not required. As an alternative, measurement of the outdoor airflow can be waived if a Constant Airflow Regulating (CAR) damper with a manufacturer-specified maximum flow rate no higher than 15 CFM or 15% above the ventilation design value is installed on the inlet.
7. Airflow design rates and run-times shall be determined using ASHRAE 62.2-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided. For dwelling units, the minimum ventilation rate required by ASHRAE 62.2 can be calculated using either Equation 4.1a or Table 4.1a. For sleeping units, the following equation must be used to determine minimum airflow rates:  $0.01 \times \text{Conditioned Floor Area} + 7.5 \times (\text{number of beds})$ .
8. Where the Exhaust Fan Type in Section 2b indicates "Continuous" for both Bathroom and Kitchen, the Rater may use this equation to determine the maximum ventilation rate allowed:  $30 \text{ CFM} \times \text{number of bathrooms} + 75 \text{ CFM}$ .
9. Airflow design rates shall be determined using ASHRAE 62.1-2010 or later. Designers are permitted, but not required, to use published addenda and/or more recent editions of the standard to assess compliance. The year of the standard that is used shall be listed in the space provided.
10. The following spaces require outdoor air ventilation: corridors, offices, break rooms, gyms, fitness centers, exercise rooms, lobbies, community rooms, meeting rooms, multi-purpose rooms, lounges, laundry rooms, swimming pools, daycares, classrooms, shared or commercial kitchens, shared dining rooms, and computer rooms.
11. For permits on or before 01/01/2024, where outdoor air is supplied to a common space via a PTAC or PTHP, in lieu of measurement, the design CFM shall meet or exceed the ventilation rates required by ASHRAE 62.1-2010 and the space served by the PTAC or PTHP shall have at least one operable window. For permits after 01/01/2024, both the runtime and measurement of outdoor air through these systems will be required to demonstrate compliance with ASHRAE 62.1-2010 or alternative ventilation system specified (e.g., ducted supply).
12. If the tables provided cannot accommodate all the unit plans, spaces, or systems in the building, use the tables in Appendix A to supplement the Design Report.
13. List each individual common space separate from other spaces, such that when reporting airflow for Items 2.8 and 2.9, compliance for each space can be demonstrated. For example, list an office space separate from a community room, even if these spaces are served by the same system and even if the outdoor air rates required are the same. Similarly, where a space is repeated in the building, such as a corridor, report each space by floor (e.g., FL1 Corridor, FL2 Corridor). Rather than list these values in this report, as an alternative, the HVAC Designer is permitted to submit the values in a separate document or file. Where the building has total corridor space  $\leq 250 \text{ ft}^2$  and does not contain any of the other common spaces which require outdoor air per Item 2.2, outdoor air is not required to be provided to the corridor and "N/A" may be entered for Item 2.9.
14. In addition, consult manufacturer requirements to ensure return air temperature requirements are met.





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15. Dwelling-unit mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.7. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated  $\geq 400$  CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be  $\geq 4$  ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
16. Note that the 'fan-on' setting of a thermostat would not be an acceptable controller because it would continuously operate the HVAC fan.
17. Bathroom fans with a rated flow rate  $\geq 500$  CFM and heat/energy recovery ventilation fans are exempted from the requirement to be ENERGY STAR certified.
18. As an alternative to meeting or exceeding the efficiency standards for NEMA Premium motors, documentation that an exhaust fan motor has a fan energy index (FEI)  $\geq 1.2$  at the design point of operation OR a fan efficacy  $\geq 1.1$  CFM/Watt is permitted.
19. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the building maintenance staff.
20. Two alternatives to the required 10 ft. distance are provided: 1) inlets providing outdoor air to a dwelling unit are permitted to be  $\geq 5$  ft. of stretched-string distance from outlets of both exhaust dwelling-unit mechanical ventilation systems and local mechanical exhaust systems, and 2) the outlet and inlet of ERV's and HRV's may use a smaller distance if allowed by the manufacturer of the system. If the second alternative is used, the manufacturer's instructions shall be collected for documentation purposes.
21. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the design airflow rate. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the design airflow rate. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
22. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.
23. Where 5 ACH is selected, kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be  $\geq 25$  CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume. As an alternative to 5 ACH for Dwelling Units and Sleeping Units (but not Townhouses), 50 CFM of continuous exhaust is permitted to be used, regardless of kitchen volume. In such cases, the edge of the exhaust fan or intake grille shall be located within 10 ft of the edge of the range, as measured horizontally on the floor plan.
24. While not required, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 are recommended to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC.
25. As an alternative, dwelling units are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both dwelling unit ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate  $\leq 1.0$  ACH50 or  $\leq 0.05$  CFM50 per ft<sup>2</sup> of Enclosure Area. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
26. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting  $\geq 5$  ACH, based on the kitchen volume.
27. For continuous system operation, the lower rate may be used. Otherwise, use the higher rate. Commercial kitchens shall be designed to provide a minimum continuous rate of 0.70 cfm/ft<sup>2</sup>.
28. As an alternative, for a toilet room intended to be occupied by one person at a time, a minimum continuous rate of 25 cfm is permitted.
29. This section / item applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtu/h with forced-air distribution systems and to furnaces up to 225 kBtu/h with forced-air distribution system serving individual dwelling units. Forced-air distribution systems are those that supply air through ductwork exceeding 0 ft. in length. For VRF air conditioners or heat pumps, the capacity of the system is the rated cooling capacity of the outdoor unit. This section / item is recommended, but not required for non-ducted systems, such as non-ducted mini-splits, multi-splits, PTHP's, or PTAC's.
30. Select "2013 / 2017 ASHRAE Fundamentals" if using Chapter 17 of the 2013 or 2017 ASHRAE Handbook of Fundamentals. Select "Other per AHJ" if the Authority Having Jurisdiction where the unit will be certified mandates the use of a load calculation methodology other than Unabridged ACCA Manual J v8 or 2013 or 2017 ASHRAE Handbook of Fundamentals.
31. Check the box for "unit-specific design" if the design was created for the specific plan configuration (i.e., elevation, option, orientation, and county) of the unit to be certified. Check the box for "group design" if designs were created for unit plans that are repeated throughout the building with potentially different configurations (i.e., different elevations and/or orientations). Check the box for "worst-case design" if loads for the unit with the largest heat gain in the building are less than 18 kBtu/h and are being used to represent all other units. Only one box may be checked. Regardless of the box checked, the system design as documented on this HVAC Design Report must fall within the following tolerances for the unit to be certified:
  - Item 3.4: The outdoor design temperature used in loads are within the limits defined at [www.energystar.gov/hvacdesigntemps](http://www.energystar.gov/hvacdesigntemps).
  - Item 3.6: The number of occupants used in loads is within  $\pm 2$  of the dwelling unit to be certified.
  - Item 3.7: Total occupant gains used in loads shall not exceed 645 Btu/h per occupant.
  - Item 3.8: The conditioned floor area used in loads is between 100 ft<sup>2</sup> smaller and 300 ft<sup>2</sup> larger than the dwelling unit to be certified.
  - Item 3.9: The window area used in loads is between 15 ft<sup>2</sup> smaller and 60 ft<sup>2</sup> larger than the dwelling unit to be certified, or for dwelling units with  $> 500$  ft<sup>2</sup> of window area, between 3% smaller and 12% larger.
  - Item 3.10: The predominant window SHGC is within 0.1 of the predominant value in the dwelling unit to be certified.



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- Item 3.12: The mechanical ventilation rate used in loads is the same as the value in Section 2a for the given unit plan.
- Item 3.13: The sum of the internal gains associated with lighting and appliances used in loads shall not exceed 3,600 Btuh.
- Items 3.15 & 3.17: The sensible & total heat gain are documented for the configuration of the dwelling unit to be certified.
- Item 4.19: The cooling sizing % is within the cooling sizing limit selected.

Provide the National HVAC Design Report to the party you are providing these design services to (i.e., a builder / developer, Functional Testing Agent (FT Agent), and/or MEP / credentialed HVAC contractor) and to the Rater. The report is only required to be provided once per project / building. As long as a report has been provided that falls within these tolerances for the units to be certified, no additional work is required. However, if no report falls within these tolerances or if any aspect of the system design changes, then an additional report will need to be generated prior to certification. Buildings certified under Rev. 04 of the program requirements are permitted to use any Revision of the MFNC National HVAC Design Report.

Visit [www.energystar.gov/hvacdesigntools](http://www.energystar.gov/hvacdesigntools) for a tool to assist with group designs and for more information.

32. For each unique unit floorplan, document the loads for the configuration (e.g., level, orientation) that the dwelling unit might be built in. For example, if a unit plan will only be built in a specific level and orientation (e.g., top-floor, facing South), then the designer only needs to document the loads for this one configuration. To determine whether a unit floorplan is "unique", the guidance in ANSI 301-2019, Section 5.1.4.4.1 may be followed. Orientation represents the direction that the front door of the dwelling unit is facing. In Section 4, to calculate Cooling sizing % for each configuration of each unique floorplan, the same system may need to be duplicated in multiple columns.
33. Visit [www.energystar.gov/hvacdesigntemps](http://www.energystar.gov/hvacdesigntemps) for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR. For "County & State, or US Territory, selected", select the County and State or US Territory (i.e., Guam, Northern Mariana Islands, Puerto Rico, or US Virgin Islands), where the unit is to be certified. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93°F, then the same report could be used in Fairfax County (which has a higher limit of 94°F) but not in Arlington County (which has a lower limit of 92°F). If a jurisdiction-specified design temperature is used that exceeds the limit in the ENERGY STAR Single-Family New Homes Design Temperature Limit Reference Guide, designers must submit a Design Temperature Exception Request. Visit [www.energystar.gov/hvacdesigntemps](http://www.energystar.gov/hvacdesigntemps) for a copy of this form.
34. To determine the number of occupants among all HVAC systems in the dwelling unit, calculate the number of bedrooms, as defined below, and add one. This number of occupants must be within  $\pm 2$  of the dwelling unit to be certified.  

A bedroom is defined by ANSI / RESNET / ICC 301-2014 as a room or space 70 ft<sup>2</sup> or greater size, with egress window and closet, used or intended to be used for sleeping. A "den", "library", or "home office" with a closet, egress window, and 70 ft<sup>2</sup> or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

  - have a sill height of not more than 44 inches above the floor; AND
  - have a minimum net clear opening of 5.7 ft<sup>2</sup>; AND
  - have a minimum net clear opening height of 24 in.; AND
  - have a minimum net clear opening width of 20 in.; AND
  - be operational from the inside of the room without the use of keys, tools or special knowledge.
35. The difference between the Conditioned Floor Area (CFA) used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 22, as verified by a Rater. Be advised, the Rater will calculate CFA using the definition in ANSI / RESNET / ICC 301-2019, which defines this value, in part, as the floor area of the Conditioned Space Volume within a building or Dwelling Unit, not including the floor area of attics, crawlspaces, and basements below air sealed and insulated floors. See <https://codes.iccsafe.org/content/RESNET3012019P1/3-definitions-> for the complete definition.
36. The difference between the window area used in the design and the actual dwelling unit to be certified must fall within the tolerance specified in Footnote 22, as verified by a Rater. Be advised, the Rater will calculate window area using the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC 301-2019, which instructs the Rater to measure the width and height of the rough opening for the window and round to the nearest inch, and then to use these measurements to calculate window area, rounding to the nearest tenth of a square foot. See <https://codes.iccsafe.org/content/RESNET3012019P1/normative-appendix-b-inspection-procedures-for-minimum-rated-features> for the complete protocol.
37. "Predominant" is defined as the SHGC value used in the greatest amount of window area in the dwelling unit.
38. Infiltration rate shall use "Tight" values for the cooling season infiltration rate and "Tight" values for the heating season infiltration rate, as defined by Table 5A or 5B of ACCA Manual J, Eighth Edition, Version Two. Alternatively, infiltration rate shall not exceed 0.24 air changes per hour.
39. Equipment shall be selected using the maximum total heat gain and the total heat loss in Section 3 per ACCA Manual S, Second Edition, except that cooling ranges above ACCA Manual S limits are temporarily allowed, per Item 4.19, and heating ranges above ACCA Manual S limits are allowed where heating and hot water are provided by the same equipment or where standby equipment is needed for redundancy, but only operate when the primary equipment is not operating. For equipment outside the scope of ACCA Manual S, "Other" may be indicated and the equipment sizing approach listed in the space provided.
40. Electric resistance limitations do not apply to heat pumps with integral supplemental or emergency electric resistance heating. EPA recommends but does not require that heat pumps have controls to limit the use of emergency or supplemental heat to heat pump failures or when the heat pump cannot meet the heating load. EPA also recommends but does not require that heat pumps in CZ 5-8 are ENERGY STAR certified cold-climate heat pumps. Electric resistance limitations do not apply to systems dedicated to heating outdoor air supplied by a mechanical ventilation system, as long as the space served is primarily heated by a non-electric-resistance system that meets the efficiency requirements noted in Exhibit X. Electric resistance limitations apply to garages, but do not apply to heated plenums meeting Item 4.37, or stairwells where automatic thermostatic controls prevent operation above 50°F.





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41. If the equipment contains multiple components, the AHRI Reference # shall represent the rated efficiency of the specific combination of indoor and outdoor components. EPA recommends, but does not require, that the rating also encompass the furnace when such a rating is available. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency. For residential split air conditioners and heat pumps, the rated efficiency shall be for the specific combination of indoor and outdoor components of the air conditioner or heat pump, along with confirmation that the two components are designed to be used together. If the AHRI Reference # is reported in Item 4.10 (e.g., heat pumps), the AHRI Reference # does not need to be listed again in Item 4.27.
42. The full system capacity at design conditions, from OEM expanded performance data, shall be listed and shall include the capacity of all systems providing space cooling to the dwelling unit. For two-speed or variable-speed equipment, the full system capacity shall reflect the capacity at the maximum available compressor speed or when the compressor operates at the AHRI rating test speed, respectively.
43. Per ACCA Manual S, Second Edition, if the load sensible heat ratio is  $\geq 95\%$  and the HDD / CDD ratio is  $\geq 2.0$ , then the Climate is Condition B, otherwise it is Condition A.
44. As an alternative for low-load dwelling units, a system match-up including a single-speed compressor with a total capacity  $\leq 20$  kBtu/h is permitted to be used in spaces with a total cooling load  $\leq 15$  kBtu/h. A system match-up including a two-speed or variable-speed compressor with a total capacity  $\leq 25$  kBtu/h is permitted to be used in spaces with a total cooling load  $\leq 18$  kBtu/h.
45. The full system capacity shall be listed for the heating system. For two-stage and modulating furnaces, the full system capacity shall reflect the maximum output available. For shared boilers, the full system capacity may exclude standby equipment needed for redundancy.
46. Per the 2009 International Mechanical Code, a direct-vent furnace or boiler is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under non-positive static vent pressure entirely by natural draft. Naturally drafted equipment is only allowed if located in a space outside the pressure boundary, where the envelope assemblies separating it from conditioned space are insulated and air-sealed. For mechanically drafted boilers, make-up air sources must be mechanically closed when the boiler is not in operation.
47. Designers may provide supplemental documentation with room-by-room and total design airflows in lieu of completing Item 5.2. Sample supplemental documentation can be found at [www.energystar.gov/hvacdesigntools](http://www.energystar.gov/hvacdesigntools).
48. Orientation-specific room-by-room design airflows are recommended, but not required, to distribute airflow proportional to load, thereby improving comfort and efficiency. While air-balancing of supply registers and return grilles is not required to be completed as part of HVAC Functional Testing, it is recommended that ducted HVAC systems be designed such that they can be balanced in the field (i.e., provide proper access to any and all balancing dampers, provide ducting and grille layouts such that accurate air measurements can be taken).
49. Design HVAC fan airflow is the design airflow for the blower in CFM, as determined using the manufacturer's expanded performance data. The Functional Testing Agent is required to measure the HVAC fan airflow using the mode with the higher airflow, within  $\pm 15\%$  of design.
50. Design HVAC fan speed setting is the fan speed setting on the control board (e.g., low, medium, high) that corresponds with the Design HVAC fan airflow.
51. Design total external static pressure is the pressure corresponding to the Design HVAC fan airflow, inclusive of external components (e.g., evaporator coil, whole-house humidifier, or  $\geq$  MERV 6 filter).
52. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
53. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust or exhaust-only dwelling-unit ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
54. Item 6.5 generally applies to the ducts of space heating, space cooling, and Dwelling Unit Mechanical Ventilation Systems. However, visual inspection is permitted in lieu of testing for the following system types: 1) a Dwelling Unit Mechanical Ventilation System not connected to the space heating or space cooling system, regardless of the number of dwelling units it serves; 2) a space heating or space cooling system for which the ducts and air handler are in conditioned space and the total supply duct length of the system, including all supply trunks and branches, is  $\leq 10$  ft; and 3) a space heating or space cooling system that serves more than one dwelling unit. In such cases, a Rater shall visually verify that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
55. Duct leakage shall be determined and documented by a Rater in accordance with ANSI / RESNET / ICC 380. Leakage limits shall be assessed on a per-system, rather than per-dwelling unit, basis. For a duct system with one or two returns, the total Rater-measured duct leakage is permitted to be the greater of  $\leq 4$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 40$  CFM25 at 'rough-in' or the greater of  $\leq 8$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 8$  CFM25 at 'final'. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of  $\leq 6$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 60$  CFM25 at 'rough-in' or the greater of  $\leq 12$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 120$  CFM25 at 'final'. For a duct system without any ducted returns, the total Rater-measured duct leakage is permitted to be the greater of  $\leq 3$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 30$  CFM25 at 'rough-in' or the greater of  $\leq 6$  CFM25 per 100 ft<sup>2</sup> of CFA or  $\leq 60$  CFM25 at 'final' and, the Rater-measured pressure difference between the space containing the air handler and the conditioned space, with the air handler running at high speed, is  $\leq 5$  Pa. For systems  $> 1$  ton, increase by 1 Pa per half ton.
56. For the purpose of computing leakage allowance, at rough-in, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 133% of the sum of the design exhaust airflow of the dwelling units served by that fan. At final, the 'exhaust fan flow' shall be the lesser of the rated fan flow (i.e., nameplate rating) and 143% of the sum of the design exhaust airflow of the dwelling units served by that fan. To calculate central exhaust duct leakage allowance, EPA recommends using worksheet 3b of the Multifamily Workbook. Measured fan flow (either at the fan itself or the total airflow measured from all exhaust grilles served by the fan) may be used in lieu of the rated fan flow to determine the leakage allowance. This test is not required of central exhaust systems serving clothes dryers but is required for the central exhaust portion of balanced systems such as HRVs and ERVs.



# ENERGY STAR Multifamily New Construction

## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

### Appendix A – Supplementary tables for Section 2 and 3

2a. Dwelling Unit & Common Space Mechanical Ventilation Design <sup>4, 5</sup>						
<b>List unique unit plan for which 62.2 ventilation rates were calculated in the spaces to the right:</b>						
2.4 # of bedrooms:						
2.5 Square footage:						
2.6 Ventilation airflow rate required by ASHRAE 62.2:						
2.7 Ventilation airflow rate designed:						
2.7.1 If applicable, run-time per cycle (minutes):						
2.7.2 If applicable, cycle time (minutes):						

<b>List common space for which 62.1 ventilation rates were calculated in the spaces to the right:</b>						
2.8 Ventilation airflow rate required by ASHRAE 62.1:						
2.9 Ventilation airflow rate designed:						

System Type & Controls:						
List Ventilation System ID in the spaces to the right:						
2.10 Specified system type: (e.g., supply, exhaust, balanced, ERV, HRV)						
2.11 Manufacturer:						
2.12 Model Number:						
2.13 # installed in the building:						
2.14 Spaces each fan serves (i.e., single, multiple)						
2.15 Area / space(s) that system serves: (e.g., Unit A kitchens, corridor, community room)						
2.16 Specified control location: (e.g., Master bath, utility):						

3. Heating & Cooling Loads						
<b>Dwelling Unit Heating &amp; Cooling Loads</b> (only required for ducted split AC, unitary AC, ASHP, WSHP, GSHP, and furnaces) <sup>28</sup> <input type="checkbox"/> N/A						
<b>List the unit plan for which Loads were calculated:</b>						
3.5 Location of Unit: top, mid, bottom, corner, interior						
3.6 Number of occupants used in loads: <sup>31, 34</sup>						
3.7 Total occupant gains (Btuh): <sup>31</sup>						
3.8 Conditioned floor area used in loads: <sup>31, 35</sup>						
3.9 Window area used in loads: <sup>31, 36</sup>						
3.10 Predominant window SHGC used in loads: <sup>31, 37</sup>						
3.11 Infiltration (ACH / ACH50) used in loads: <sup>38</sup>						
3.12 Mechanical ventilation (CFM) used in loads:						
3.13 Non-occupant Internal gains (appliance, equipment and lighting) used in loads (Btuh): <sup>31</sup>						
3.14 Door orientation (N, NE, E, SE, S, SW, W, NW): <sup>32</sup>						
3.15 Sensible Heat Gain At Design Conditions (kBtuh): <sup>31</sup>						
3.16 Latent Heat Gain At Design Conditions (kBtuh):						
3.17 Total Heat Gain at Design Conditions (kBtuh): <sup>31</sup>						
3.18 Total Heat Loss at Design Conditions (kBtuh):						



# ENERGY STAR Multifamily New Construction

## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

### Appendix A – Supplementary tables for Section 3

3.19 Common Space Heating & Cooling Loads (required for all common space heating and cooling systems)			
Common Space Name:	<small>3rd Floor Commons</small>	Design Conditions: Total Heat Gain:	<small>14,238</small> (kBtuh)      Total Heat Loss: <small>14,359</small> (kBtuh)
Common Space Name:	<small>3rd Floor Multi Purpose</small>	Design Conditions: Total Heat Gain:	<small>24,591</small> (kBtuh)      Total Heat Loss: <small>20,450</small> (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
Common Space Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)

3.20 Building Heating & Cooling Loads (only required when shared systems such as central boilers or chillers are specified)			
System Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
System Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
System Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)
System Name:		Design Conditions: Total Heat Gain:	_____ (kBtuh)      Total Heat Loss: _____ (kBtuh)



# ENERGY STAR Multifamily New Construction

## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

### Appendix A – Supplementary tables for Section 4

4. Heating & Cooling Equipment Selection							
<b>Cooling Equipment</b> (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where cooling is not provided, check "N/A".) <span style="float: right;"><input type="checkbox"/> N/A</span>							
List Cooling Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.4 Equipment type: (PTAC / AC, Chiller / CT, PTHP / WLHP / GSHP / ASHP / VRF)							
4.5 Area / Space(s) that system serves:							
4.6 Chiller / condenser / outdoor unit manufacturer:							
4.7 Chiller / condenser / outdoor unit model #:							
4.8 Evaporator / indoor unit manufacturer:							
4.9 Evaporator / indoor unit model #:							
4.10 AHRI reference #: <sup>41</sup>							
4.11 Rated efficiency:							
4.12 Evaporator fan type: PSC, ECM / ICM Other:							
4.13 Compressor speed: Single, Two, Variable							
4.14 Turn down ratio (for variable speed equipment):							
4.15 Latent capacity at design conditions (kBtuh): <sup>42</sup>							
4.16 Sensible capacity at design conditions (kBtuh): <sup>42</sup>							
4.17 Total capacity at design conditions (kBtuh): <sup>42</sup>							
4.18 Cooling sizing % = Total capacity (Item 4.17) divided by Total Heat Gain of space(s) in Item 4.5:							
4.19 Meets cooling sizing limit: (A, B, C, D or N/A) <sup>29, 31</sup>							
4.20 If "B", list Load sensible heat ratio = Max. sensible heat gain (Item 3.15) / Max. total heat gain (Item 3.17): <sup>39</sup>							
4.21 If "B", calculate HDD / CDD ratio: <sup>43</sup>							
Equipment Type & Climate Condition	Compressor Type (Per Item 4.13)						
	Single-Speed	Two-Speed	Variable-Speed				
A: For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate <sup>43</sup>	Recommended: 90 – 115% Allowed: 90 – 130%	Recommended: 90 – 120% Allowed: 90 – 140%	Recommended: 90 – 130% Allowed: 90 – 160%				
B: For Cooling Mode of Heat Pump in Condition B Climate <sup>43</sup>	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh	90% - 100%, plus 15 kBtuh				
C: For low-load spaces (≤15 kBtuh) <sup>44</sup>	≤ 20 kBtuh						
D: For low-load spaces (≤18 kBtuh) <sup>44</sup>		≤ 25 kBtuh	≤ 25 kBtuh				
<b>Heating Equipment</b> (Complete all applicable items, noting "N/A" as needed; where the same Equipment ID is used in multiple spaces (columns), identical data is not required to be repeated and can be left blank; where heating is not provided, check "N/A".) <span style="float: right;"><input type="checkbox"/> N/A</span>							
List Heating Equipment ID in the spaces to the right; duplicating as needed for each unique space served:							
4.22 Electric equipment type: PTHP, WLHP, GSHP, ASHP, VRF, Boiler, Furnace, Electric Resistance							
4.23 Gas Equipment type: HW PTAC / fan coil, Gas-Fired PTAC, Boiler, Furnace							
4.24 Area / Space(s) that system serves:							
4.25 Manufacturer:							
4.26 Model Number:							
4.27 AHRI reference #: <sup>41</sup>							
4.28 Rated efficiency:							
4.29 Equipment output capacity (kBtuh):							
4.30 Air-source heat pump output capacity (kBtuh) (17°F):							
4.31 Type of Venting: Natural Draft, Mechanically Drafted, Direct Vent <sup>46</sup>							



# ENERGY STAR Multifamily New Construction

## National HVAC Design Report <sup>1</sup>, Version 1 / 1.1 / 1.2 (Rev. 04)

4.32 Furnace heating sizing % = Total capacity (Item 4.29) divided by Total Heat Loss of space(s) in Item 4.24:							
4.33 Meets furnace sizing limit: (A, B, C, or N/A) <sup>29</sup>							
A: For low-load spaces ( $\leq 10$ kBtuh), furnace output capacity is $\leq 40$ kBtuh							
B: When Used for Heating Only				C: When Paired With Cooling			
100 – 400%				Recommended: 100 – 140%		Allowed: 100 – 400%	

### Appendix A – Supplementary tables for Section 5

#### 5. Dwelling-Unit Duct Design

5.2 Room-by-room design airflows documented below (which must sum to the mode with the higher Design HVAC fan airflow). <sup>12, 47, 48</sup>

Name of the unit plan:				Name of the unit plan:			
Design HVAC fan airflow: <sup>49</sup>				Design HVAC fan airflow: <sup>49</sup>			
Cooling mode _____ CFM		Heating mode _____ CFM		Cooling mode _____ CFM		Heating mode _____ CFM	
Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup>				Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup>			
Cooling mode _____		Heating mode _____		Cooling mode _____		Heating mode _____	
Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> _____ IWC				Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> _____ IWC			
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)	
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
Total for all rooms				Total for all rooms			

Name of the unit plan:				Name of the unit plan:			
Design HVAC fan airflow: <sup>49</sup>				Design HVAC fan airflow: <sup>49</sup>			
Cooling mode _____ CFM		Heating mode _____ CFM		Cooling mode _____ CFM		Heating mode _____ CFM	
Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup>				Design HVAC fan speed setting (e.g., low, medium, high): <sup>50</sup>			
Cooling mode _____		Heating mode _____		Cooling mode _____		Heating mode _____	
Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> _____ IWC				Design total external static pressure (corresponding to the mode with the higher airflow above): <sup>51</sup> _____ IWC			
Room Name		Design Airflow (CFM)		Room Name		Design Airflow (CFM)	
1				1			
2				2			
3				3			
4				4			
5				5			
6				6			
7				7			
8				8			
9				9			
10				10			
Total for all rooms				Total for all rooms			

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 57

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$692

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

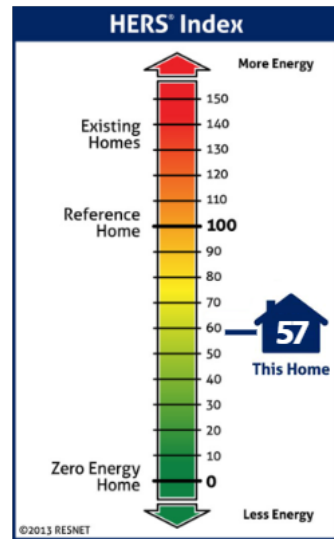
Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	5.9	\$190
Cooling	1.0	\$31
Hot Water	4.8	\$156
Lights/Appliances	9.0	\$293
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>20.6</b>	<b>\$754</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2012 Iowa Energy Code  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code  
2012 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, end unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	658 ft <sup>2</sup>
Number of Bedrooms:	1
Primary Heating System:	Air Source Heat Pump • Electric • 7.8 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 15.2 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	0.0299 CFM50 / s.f. Shell Area (Adjusted Infiltration: 0.34 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-21
Ceiling:	Adiabatic, R-19
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	N/A

## Rating Completed by:

Energy Rater: Erik Henson  
RESNET ID: 8252370

Rating Company: Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

Rating Provider: Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:11 PM



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

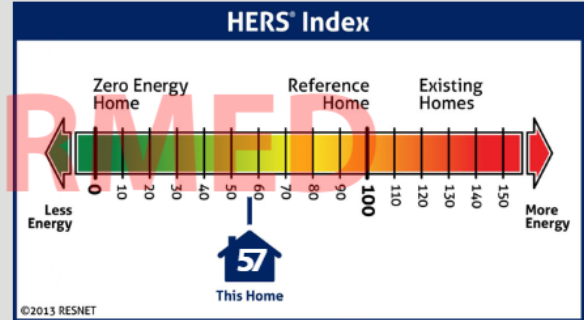




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 0.0299 CFM50 / s.f. Shell Area

**Primary Insulation Levels:**

**Ceiling:** R-19      **Floor:** N/A  
**Wall:** R-21      **Slab:** R-10

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Post-Construction)**      **Untested Forced Air**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 7.8 HSPF2**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 15.2 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 0      **Dishwashers:** 0  
**Ceiling Fans:** 0      **Exhaust Fans:** 0

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.



# 2015 IECC R-406 Projected Energy Rating Index Report

## Property

Builder:  
Address: Knoxville, Knoxville, IA 50138

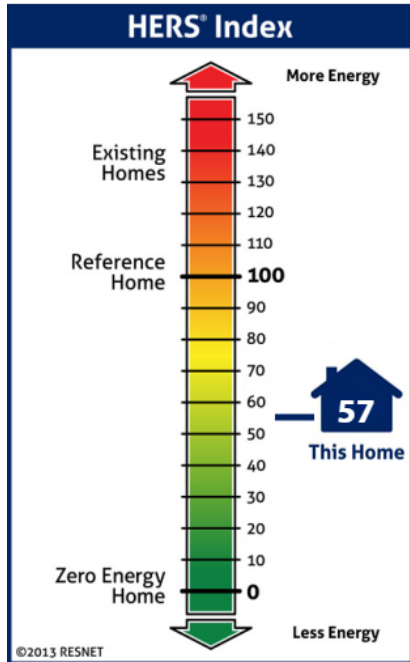
## Organization

Company: Midwest Energy Consultants  
Phone: 913-305-7224  
Rater: Erik Henson

## Energy Rating Index Information

Projected Rating  
Rating No:  
Date Rated: 2025-02-01  
Rater ID (RTIN): 8252370

**DOES NOT PASS**



Estimated Annual Energy Consumption*			
	Rated Home Calculated Energy Use (MBtu)	Rated Home Cost (\$/yr)	
Heating	6.3		\$202
Cooling	0.9		\$29
Water Heating	4.8		\$156
Lights & Appliances	9.0		\$293
Photovoltaics	0.0		\$0
Service charge	-		\$84
<b>Total</b>	<b>21.0</b>	<b>\$764</b>	

\*Based on standard operating conditions

ERI with PV:57		ERI without PV:57	
Annual Estimates			
Electric (kWh):	6,144.1	CO2 Emissions (Tons):	0.8
Natural Gas (Therms):	0.0	Energy Savings (\$)***:	N/A

\*\*\*Based on the 2015 IECC R-406 Reference design home

Maximum Energy Rating Index:55	This Home's Energy Rating Index:57	FAIL
<p>This home DOES NOT MEET the Energy Rating Index Score requirement of 2015 IECC R-406 for Climate Zone 5. It DOES NOT MEET all of the requirements verified by Ekotrope. Mandatory requirements are summarized on the 2nd page of this report, some of which are not verified by Ekotrope.</p>		
Name: Erik Henson	Signature: <u>Erik Henson</u>	
Organization: Midwest Energy Consultants	Digitally signed: 2/1/25 at 8:11 PM	

### Rating Provider Data and Seal

Company: Building Efficiency Resources  
Address: PO Box 1769 Brevard, NC 28712  
Phone #: 800-399-9620  
Fax #: 877-399-1361

To determine if a provider is properly accredited go to: [www.resnet.us/professional/programs/search\\_directory](http://www.resnet.us/professional/programs/search_directory)

## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
 Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
 Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Adiabatic, R-19	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-21	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Post-Construction)
<b>Framed Floor</b> N/A	<b>Heating</b> Air Source Heat Pump • Electric • 7.8 HSPF2
<b>Slab</b> R-10.0 Perimeter, R-0.0 Under	<b>Cooling</b> Air Source Heat Pump • Electric • 15.2 SEER2
<b>Infiltration</b> 0.0299 CFM50 / s.f. Shell Area	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: Erik Henson  
Digitally signed: 2/1/25 at 8:11 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.



# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-19

Above Grade Walls: R-21

Foundation Walls: N/A

Exposed Floor: N/A

Slab: R-10

Infiltration: 0.0299 CFM50 / s.f. Shell Area

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-3

### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 7.8 HSPF2

Cooling: Air Source Heat Pump • Electric • 15.2 SEER2

Hot Water: Residential Water Heater • Electric • 0.92

Energy Factor

Average Mechanical Ventilation: 48.3 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 60

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$667

\*Relative to an average U.S. home

**Home:**  
Knoxville  
Knoxville, IA 50138

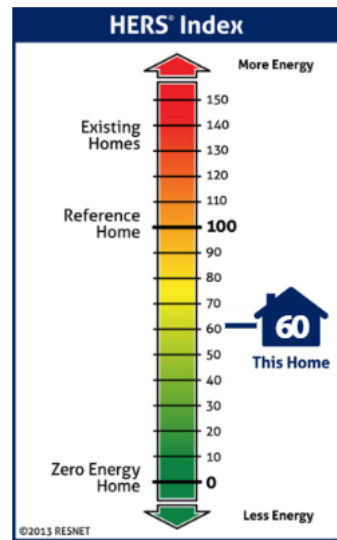
**Builder:**

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	6.2	\$202
Cooling	1.2	\$40
Hot Water	4.8	\$155
Lights/Appliances	9.0	\$292
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>21.3</b>	<b>\$773</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2015 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, end unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	658 ft <sup>2</sup>
Number of Bedrooms:	1
Primary Heating System:	Air Source Heat Pump • Electric • 7.8 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 15.2 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 UEF
House Tightness:	3 ACH50 (Adjusted Infiltration: 5.55 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-19
Ceiling:	Adiabatic, R-19
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19

## Rating Completed by:

**Energy Rater:** Erik Henson  
RESNET ID: 8252370

**Rating Company:** Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

**Rating Provider:** Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:22 PM



Ekotrope RATER - Version:4.2.2.3561

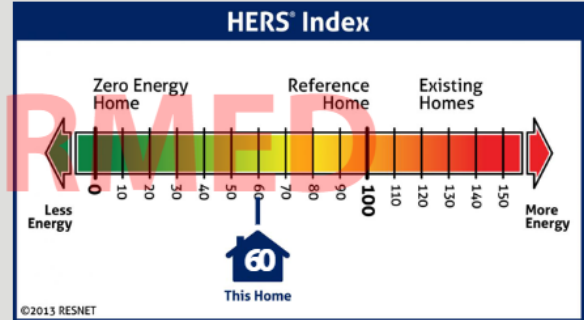
The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.



# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-19      **Floor:** R-19  
**Wall:** R-19      **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 7.8 HSPF2**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 15.2 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 UEF**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.





## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Adiabatic, R-19	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-19	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Air Source Heat Pump • Electric • 7.8 HSPF2
<b>Slab</b> N/A	<b>Cooling</b> Air Source Heat Pump • Electric • 15.2 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 UEF
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:22 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

## IECC 2015 Label

### *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

#### **Building Envelope Specs**

Ceiling: R-19

Above Grade Walls: R-19

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

#### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-3

#### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 7.8 HSPF2

Cooling: Air Source Heat Pump • Electric • 15.2 SEER2

Hot Water: Residential Water Heater • Electric • 0.92 UEF

Average Mechanical Ventilation: 48.3 CFM

#### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 57

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$669

\*Relative to an average U.S. home

**Home:**  
Knoxville  
Knoxville, IA 50138

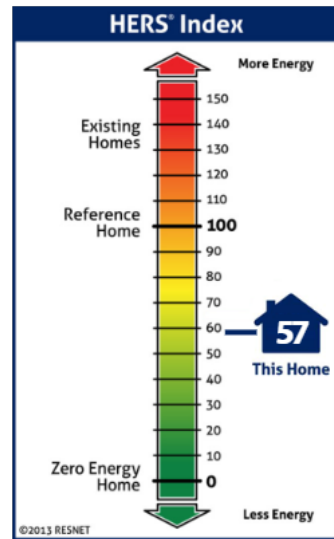
**Builder:**

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	2.3	\$75
Cooling	1.1	\$37
Hot Water	5.3	\$172
Lights/Appliances	11.6	\$377
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>20.4</b>	<b>\$745</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2012 Iowa Energy Code  
2015 International Energy Conservation Code  
2012 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	658 ft <sup>2</sup>
Number of Bedrooms:	1
Primary Heating System:	Resistance Heater • Electric • 1 Adjusted Efficiency
Primary Cooling System:	Air Conditioner • Electric • 14 SEER
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	3 ACH50 (Adjusted Infiltration: 0.33 ACH50)
Ventilation:	58 CFM • 58 Watts • HRV
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-21
Ceiling:	Adiabatic, R-19
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19

## Rating Completed by:

**Energy Rater:** Erik Henson  
RESNET ID: 8252370

**Rating Company:** Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

**Rating Provider:** Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:24 PM



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

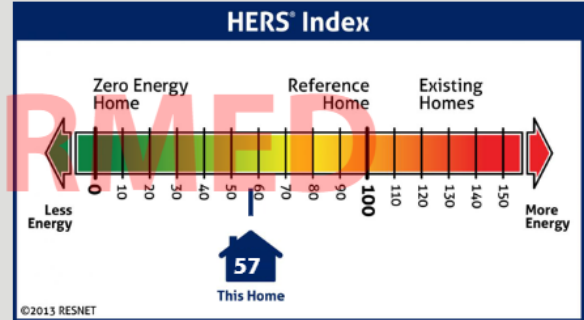




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-19      **Floor:** R-19  
**Wall:** R-21      **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Resistance Heater • Electric • 1 Adjusted Efficiency**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Conditioner • Electric • 14 SEER**

**Whole-House Ventilation Type (System Type):**

**Balanced**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.





## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Adiabatic, R-19	<b>Duct</b> Supply R-8.0, Return R-8.0
<b>Above Grade Walls</b> R-21	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Resistance Heater • Electric • 1 Adjusted Efficiency
<b>Slab</b> N/A	<b>Cooling</b> Air Conditioner • Electric • 14 SEER
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:24 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-19

Above Grade Walls: R-21

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R8, Return: R8

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-3

### **Mechanical Equipment Specs**

Heating: Resistance Heater • Electric • 1 Adjusted  
Efficiency

Cooling: Air Conditioner • Electric • 14 SEER

Hot Water: Residential Water Heater • Electric • 0.92  
Energy Factor

Average Mechanical Ventilation: 58 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 56

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$715

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

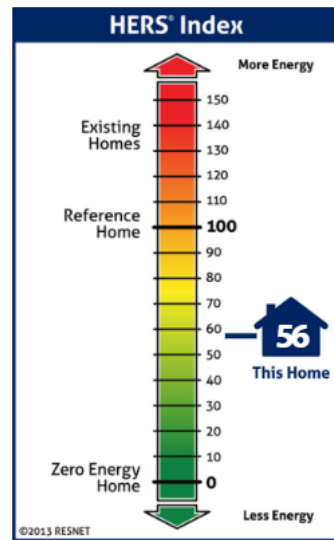
Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	6.0	\$195
Cooling	1.3	\$43
Hot Water	4.8	\$156
Lights/Appliances	8.9	\$290
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>21.1</b>	<b>\$768</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, end unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	658 ft <sup>2</sup>
Number of Bedrooms:	1
Primary Heating System:	Air Source Heat Pump • Electric • 8.2 HSPF
Primary Cooling System:	Air Source Heat Pump • Electric • 14 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	3 ACH50 (Adjusted Infiltration: 1.50 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-21
Ceiling:	Attic, R-49
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19

## Rating Completed by:

Energy Rater: Erik Henson  
RESNET ID: 8252370

Rating Company: Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

Rating Provider: Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:14 PM



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

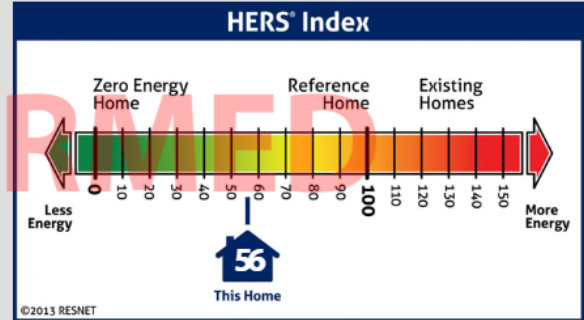




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-49      **Floor:** R-19  
**Wall:** R-21        **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**                      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 8.2 HSPF**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 14 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.





## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Attic, R-49	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-21	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Air Source Heat Pump • Electric • 8.2 HSPF
<b>Slab</b> N/A	<b>Cooling</b> Air Source Heat Pump • Electric • 14 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:14 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-49

Above Grade Walls: R-21

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-3

### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 8.2 HSPF

Cooling: Air Source Heat Pump • Electric • 14 SEER2

Hot Water: Residential Water Heater • Electric • 0.92

Energy Factor

Average Mechanical Ventilation: 41.1 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 58

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$679

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

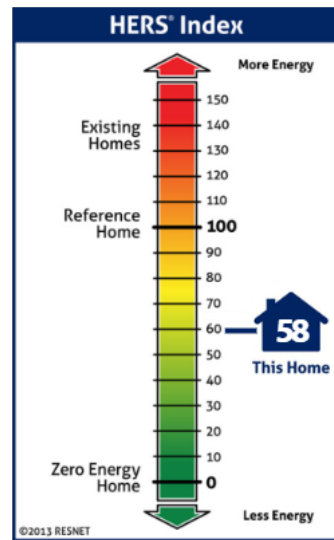
Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	6.0	\$194
Cooling	1.2	\$38
Hot Water	4.8	\$155
Lights/Appliances	9.0	\$291
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>20.9</b>	<b>\$762</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	658 ft <sup>2</sup>
Number of Bedrooms:	1
Primary Heating System:	Air Source Heat Pump • Electric • 8.2 HSPF
Primary Cooling System:	Air Source Heat Pump • Electric • 14 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 UEF
House Tightness:	3 ACH50 (Adjusted Infiltration: 5.55 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-21
Ceiling:	Attic, R-49
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19

## Rating Completed by:

Energy Rater: Erik Henson  
RESNET ID: 8252370

Rating Company: Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

Rating Provider: Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:13 PM



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

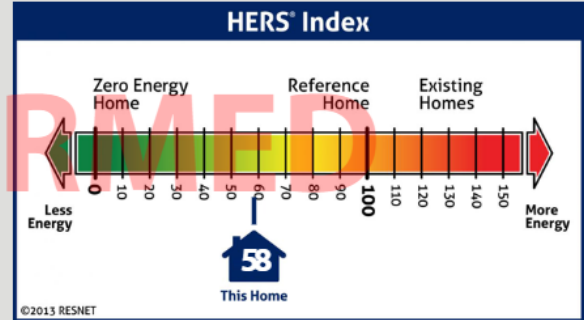




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-49      **Floor:** R-19  
**Wall:** R-21      **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 8.2 HSPF**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 14 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 UEF**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.



# 2015 IECC R-406 Projected Energy Rating Index Report

## Property

Builder:  
Address: Knoxville, Knoxville, IA 50138

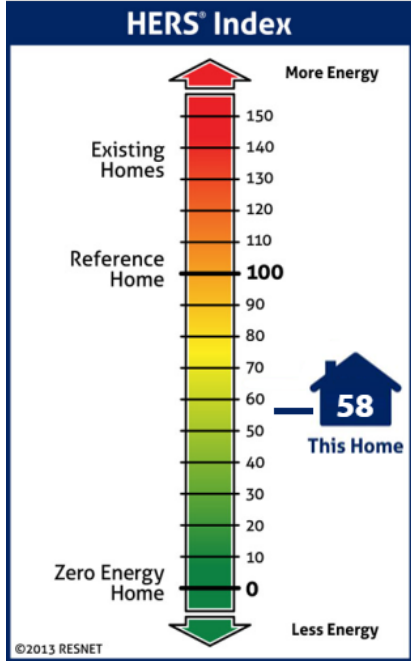
## Organization

Company: Midwest Energy Consultants  
Phone: 913-305-7224  
Rater: Erik Henson

## Energy Rating Index Information

Projected Rating  
Rating No:  
Date Rated: 2025-02-01  
Rater ID (RTIN): 8252370

**DOES NOT PASS**



Estimated Annual Energy Consumption*			
	Rated Home Calculated Energy Use (MBtu)	Rated Home Cost (\$/yr)	
Heating	5.6		\$181
Cooling	1.1		\$35
Water Heating	4.8		\$155
Lights & Appliances	9.0		\$291
Photovoltaics	0.0		\$0
Service charge	-		\$84
<b>Total</b>	<b>20.4</b>		<b>\$746</b>

\*Based on standard operating conditions

ERI with PV: 58		ERI without PV: 58	
Annual Estimates			
Electric (kWh): 5,979.1	CO2 Emissions (Tons): 0.8		
Natural Gas (Therms): 0.0	Energy Savings (\$) **: N/A		

\*\*Based on the 2015 IECC R-406 Reference design home

Maximum Energy Rating Index: 55	This Home's Energy Rating Index: 58	FAIL
<p>This home DOES NOT MEET the Energy Rating Index Score requirement of 2015 IECC R-406 for Climate Zone 5. It DOES NOT MEET all of the requirements verified by Ekotrope. Mandatory requirements are summarized on the 2nd page of this report, some of which are not verified by Ekotrope.</p>		
Name: Erik Henson	Signature: <u>Erik Henson</u>	
Organization: Midwest Energy Consultants	Digitally signed: 2/1/25 at 8:13 PM	

### Rating Provider Data and Seal

Company: Building Efficiency Resources  
Address: PO Box 1769 Brevard, NC 28712  
Phone #: 800-399-9620  
Fax #: 877-399-1361

To determine if a provider is properly accredited go to: [www.resnet.us/professional/programs/search\\_directory](http://www.resnet.us/professional/programs/search_directory)



## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
 Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
 Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Attic, R-49	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-21	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Air Source Heat Pump • Electric • 8.2 HSPF
<b>Slab</b> N/A	<b>Cooling</b> Air Source Heat Pump • Electric • 14 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 UEF
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:13 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-49

Above Grade Walls: R-21

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-3

### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 8.2 HSPF

Cooling: Air Source Heat Pump • Electric • 14 SEER2

Hot Water: Residential Water Heater • Electric • 0.92 UEF

Average Mechanical Ventilation: 43.5 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 54

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$790

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

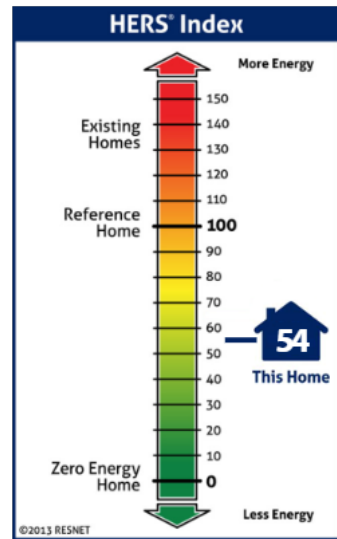
Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	5.7	\$184
Cooling	1.1	\$37
Hot Water	5.5	\$180
Lights/Appliances	10.7	\$347
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>23.1</b>	<b>\$832</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2012 Iowa Energy Code  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code  
2012 International Energy Conservation Code



## Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	841 ft <sup>2</sup>
Number of Bedrooms:	2
Primary Heating System:	Air Source Heat Pump • Electric • 7.8 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 15.2 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	3 ACH50 (Adjusted Infiltration: 5.55 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-19
Ceiling:	Adiabatic, R-19
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	N/A

## Rating Completed by:

**Energy Rater:** Erik Henson  
RESNET ID: 8252370

**Rating Company:** Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

**Rating Provider:** Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620



*Erik Henson*

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:32 PM



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

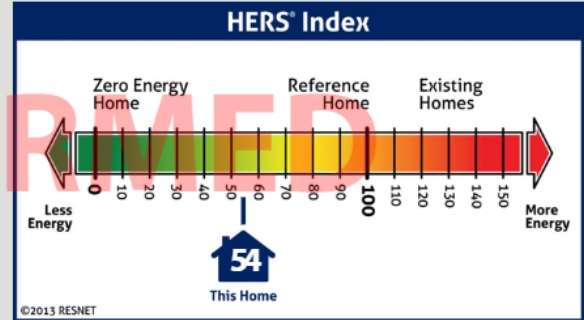




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-19      **Floor:** N/A  
**Wall:** R-19      **Slab:** R-10

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 7.8 HSPF2**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 15.2 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.





# 2015 IECC R-406 Projected Energy Rating Index Report

## Property

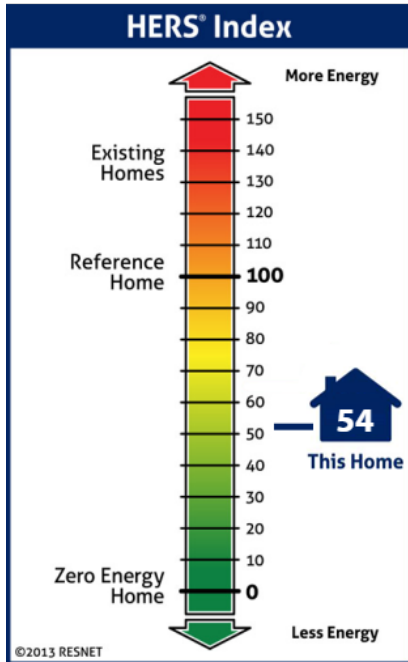
Builder:  
Address: Knoxville, Knoxville, IA 50138

## Organization

Company: Midwest Energy Consultants  
Phone: 913-305-7224  
Rater: Erik Henson

## Energy Rating Index Information

Projected Rating  
Rating No:  
Date Rated: 2025-02-01  
Rater ID (RTIN): 8252370



Estimated Annual Energy Consumption*		
	Rated Home Calculated Energy Use (MBtu)	Rated Home Cost (\$/yr)
Heating	5.1	\$166
Cooling	1.1	\$34
Water Heating	5.5	\$180
Lights & Appliances	10.7	\$348
Photovoltaics	0.0	\$0
Service charge	-	\$84
<b>Total</b>	<b>22.4</b>	<b>\$811</b>

\*Based on standard operating conditions

### ERI with PV:54

### ERI without PV:54

Annual Estimates	
Electric (kWh): 6,572.6	CO2 Emissions (Tons): 0.9
Natural Gas (Therms): 0.0	Energy Savings (\$) **: N/A

\*\*Based on the 2015 IECC R-406 Reference design home

Maximum Energy Rating Index: 55

This Home's Energy Rating Index: 54

PASS

This home MEETS the Energy Rating Index Score requirement of 2015 IECC R-406 for Climate Zone 5. It MEETS all of the requirements verified by Ekotrope. Mandatory requirements are summarized on the 2nd page of this report, some of which are not verified by Ekotrope.

Name: Erik Henson

Signature: Erik Henson

Organization: Midwest Energy Consultants

Digitally signed: 2/1/25 at 8:32 PM

## Rating Provider Data and Seal

Company: Building Efficiency Resources  
Address: PO Box 1769 Brevard, NC 28712  
Phone #: 800-399-9620  
Fax #: 877-399-1361



To determine if a provider is properly accredited go to: [www.resnet.us/professional/programs/search\\_directory](http://www.resnet.us/professional/programs/search_directory)

## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Adiabatic, R-19	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-19	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> N/A	<b>Heating</b> Air Source Heat Pump • Electric • 7.8 HSPF2
<b>Slab</b> R-10.0 Perimeter, R-0.0 Under	<b>Cooling</b> Air Source Heat Pump • Electric • 15.2 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:32 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

## IECC 2015 Label

### *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

#### **Building Envelope Specs**

Ceiling: R-19

Above Grade Walls: R-19

Foundation Walls: N/A

Exposed Floor: N/A

Slab: R-10

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

#### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-7

#### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 7.8 HSPF2

Cooling: Air Source Heat Pump • Electric • 15.2 SEER2

Hot Water: Residential Water Heater • Electric • 0.92

Energy Factor

Average Mechanical Ventilation: 48.3 CFM

#### **Builder or Design Professional**

Signature: \_\_\_\_\_

# Home Energy Rating Certificate

Projected Report  
Based on Plans

Rating Date: 2025-02-01  
Registry ID:  
Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 53

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$811

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	5.2	\$167
Cooling	1.4	\$44
Hot Water	5.5	\$180
Lights/Appliances	10.7	\$348
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>22.8</b>	<b>\$823</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2012 Iowa Energy Code  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code  
2012 International Energy Conservation Code

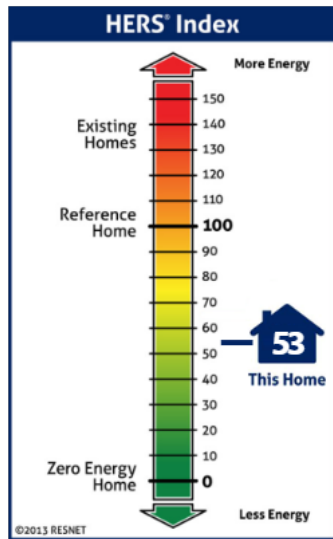
## Rating Completed by:

**Energy Rater:** Erik Henson  
RESNET ID: 8252370

**Rating Company:** Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

**Rating Provider:** Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:27 PM



## Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	841 ft <sup>2</sup>
Number of Bedrooms:	2
Primary Heating System:	Air Source Heat Pump • Electric • 7.8 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 15.2 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	3 ACH50 (Adjusted Infiltration: 5.55 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-19
Ceiling:	Adiabatic, R-19
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.



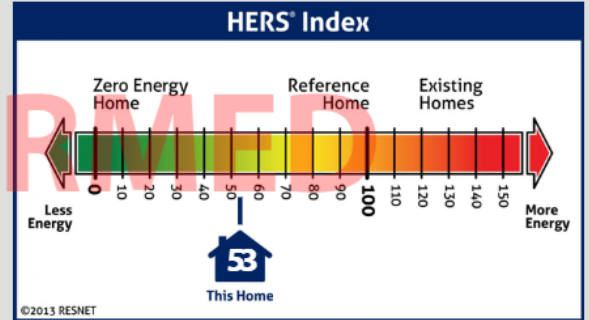




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-19      **Floor:** R-19  
**Wall:** R-19      **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 7.8 HSPF2**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 15.2 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.



## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.

# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Adiabatic, R-19	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-19	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Air Source Heat Pump • Electric • 7.8 HSPF2
<b>Slab</b> N/A	<b>Cooling</b> Air Source Heat Pump • Electric • 15.2 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:27 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.

# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-19

Above Grade Walls: R-19

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-7

### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 7.8 HSPF2

Cooling: Air Source Heat Pump • Electric • 15.2 SEER2

Hot Water: Residential Water Heater • Electric • 0.92

Energy Factor

Average Mechanical Ventilation: 48.3 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_



# Home Energy Rating Certificate

Projected Report

Based on Plans

Rating Date: 2025-02-01

Registry ID:

Ekotrope ID: dmaN43gd



## HERS® Index Score:

# 53

Your home's HERS score is a relative performance score. The lower the number, the more energy efficient the home. To learn more, visit [www.hersindex.com](http://www.hersindex.com)

## Annual Savings

# \$819

\*Relative to an average U.S. home

Home:  
Knoxville  
Knoxville, IA 50138

Builder:

## Your Home's Estimated Energy Use:

	Use [MBtu]	Annual Cost
Heating	6.4	\$205
Cooling	1.4	\$47
Hot Water	5.5	\$179
Lights/Appliances	10.7	\$347
Service Charges		\$84
Generation (e.g. Solar)	0.0	\$0
<b>Total:</b>	<b>24.1</b>	<b>\$862</b>

## This home meets or exceeds the criteria of the following:

ENERGY STAR MF v1.1  
ENERGY STAR MF v1.0  
2012 Iowa Energy Code  
2018 International Energy Conservation Code  
2015 International Energy Conservation Code  
2012 International Energy Conservation Code

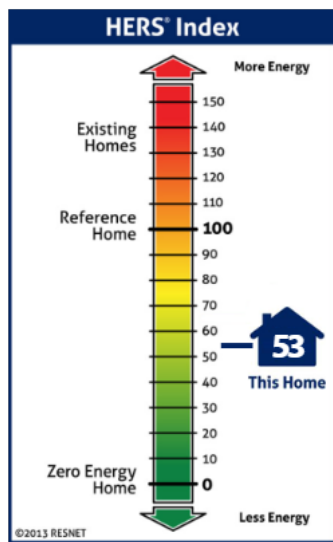
## Rating Completed by:

**Energy Rater:** Erik Henson  
RESNET ID: 8252370

**Rating Company:** Midwest Energy Consultants  
1711 N 75th Dr  
913-305-7224

**Rating Provider:** Building Efficiency Resources  
PO Box 1769 Brevard, NC 28712  
800-399-9620

Erik Henson, Certified Energy Rater  
Digitally signed: 2/1/25 at 8:12 PM



## Home Feature Summary:

Home Type:	Apartment, inside unit
Model:	N/A
Community:	N/A
Conditioned Floor Area:	841 ft <sup>2</sup>
Number of Bedrooms:	2
Primary Heating System:	Air Source Heat Pump • Electric • 7.8 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 15.2 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 0.92 Energy Factor
House Tightness:	3 ACH50 (Adjusted Infiltration: 5.55 ACH50)
Ventilation:	58 CFM • 20.3 Watts (Default) • Exhaust Only
Duct Leakage to Outside:	Untested Forced Air
Above Grade Walls:	R-19
Ceiling:	Attic, R-49
Window Type:	U-Value: 0.29, SHGC: 0.27
Foundation Walls:	N/A
Framed Floor:	R-19



Ekotrope RATER - Version:4.2.2.3561

The Energy Rating Disclosure for this home is available from the Approved Rating Provider.  
This report does not constitute any warranty or guarantee.

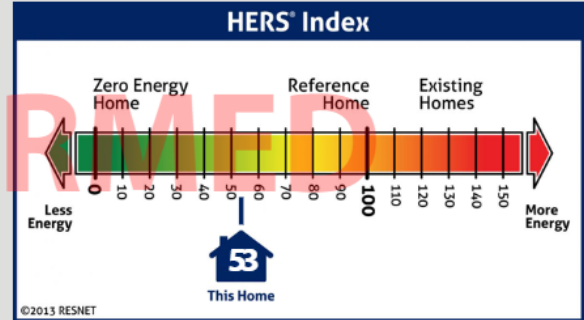




# ENERGY STAR® CERTIFIED NEW CONSTRUCTION

**Builder/Developer:**  
**Permit Date/Number:**  
**Home/Unit Address:** Knoxville, Knoxville, IA 50138

**Rating Company:** Midwest Energy Consultants  
**Rater ID Number:** 8252370  
**Rating Date:** 2025-02-01  
**Oversight By:** RESNET  
**Program/Version Number:** Multifamily V1.1



This value is not intended to be used for code compliance.

## Standard Features of ENERGY STAR Certified New Homes and Apartments

Your ENERGY STAR certified new home or apartment has been designed, constructed, and independently verified to meet rigorous requirements for energy efficiency set by the U.S. Environmental Protection Agency (EPA), including:

### Thermal Enclosure System

A complete thermal enclosure system that includes comprehensive air sealing, quality-installed insulation, and high-performing windows to deliver improved comfort and lower utility bills.



**Air Infiltration Test:** 3 ACH50

**Primary Insulation Levels:**

**Ceiling:** R-49      **Floor:** R-19  
**Wall:** R-19      **Slab:** N/A

**Primary Window Efficiency:**

**U-Value:** 0.29      **SHGC:** 0.27

### Water Management System

A comprehensive water management system to protect roofs, walls, and foundations.



Flashing, a drainage plane, and site grading to move water from the roof to the ground and then away from the home or building.

Water-resistant materials on below-grade walls and underneath slabs to reduce the potential for water entering the home or building.

Management of moisture levels in building materials during construction.

### Heating, Cooling, and Ventilation System

A high-efficiency heating, cooling, and ventilation system that is designed and installed for optimal performance.



**Total Duct Leakage:**      **Duct Leakage to Outdoors:**  
**25 CFM @ 25Pa (Rough-In, Untested Forced Air with Air Handler)**

**Primary Heating (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 7.8 HSPF2**

**Primary Cooling (System Type • Fuel Type • Efficiency):**

**Air Source Heat Pump • Electric • 15.2 SEER2**

**Whole-House Ventilation Type (System Type):**

**Exhaust Only**

### Energy Efficient Lighting and Appliances

Energy efficient products to help reduce utility bills, while providing high-quality performance.



**Energy Efficient Lighting:** 100%

**ENERGY STAR Certified Appliances and Fans:**

**Refrigerators:** 1      **Dishwashers:** 1  
**Ceiling Fans:** 0      **Exhaust Fans:** 1

**Primary Water Heater (System Type • Fuel Type • Efficiency):**

**Residential Water Heater • Electric • 0.92 Energy Factor**

#### About this certificate

The certificate provides a summary of the major energy efficiency and other construction features that contribute to this home or apartment earning the ENERGY STAR, as determined through independent inspection and verification performed by a trained professional. The Energy Rating Index or HERS index for this home, if reported, is calculated in accordance with ANSI/RESNET/ICC Standard 301, with any exceptions

approved by EPA. Because the version of Standard 301 used to calculate this index may not align with the version referenced by code, this value is not intended to be used to demonstrate compliance with code. Note that when a home or apartment contains multiple performance levels for a particular feature (e.g., window efficiency or insulation levels), the predominant value is shown. Also, homes and apartments may be certified

to earn the ENERGY STAR using a sampling protocol, whereby one home or apartment is randomly selected from a set for representative inspections and testing. In such cases, the features found in each home or apartment within the set are intended to meet or exceed the values presented on this certificate. The actual values for your home or apartment may differ, but offer equivalent or better performance.



## (Projected. Confirmation required.)

Climate Zone 5		Mandatory Requirements
Provision Number	Topic	Compliance Decision
2009 IECC Table 402.1.1 or 402.1.3	Building thermal envelope minimum insulation levels and maximum fenestration U-factor and SHGC	Pass
R401.3	Post a permanent certificate listing the level of efficiencies installed in the house	Certificate required for CO
R402.4.1.2	Envelope air leakage maximum leakage rate	Pass
R402.4.1 / Table R402.4.1.1	Comply with air sealing and insulation requirements in Table R402.4.1.1	Checklist required for CO
R402.4.4	Rooms containing fuel-burning appliances	Pass*
R402.5	Maximum fenestration U-factor and SHGC	(U-Factor) Pass
		(SHGC) Pass
R403.1.2	Heat pump controls	Pass*
R406.2	Ducts outside of conditioned space to be insulated to a minimum of R-6.	Pass*
R403.3.2	Duct sealing on all ducts	Pass*
R403.3.3	Duct testing for ducts in unconditioned space	PASS
R403.3.5	Building cavities not used as ducts.	Pass*
R403.5.1	Heated water circulation and temperature maintenance systems comply	Pass*
R403.5.3	Hot water pipe insulated to R-3	Pass
R403.6	Mechanical ventilation meeting the requirements of the IRC or IMC. Outdoor air and exhaust dampers installed	Pass*
R403.7	ACCA Manual J and S conducted for all heating and cooling systems.	ACCA forms required for permit
R403.8	Systems serving multiple dwelling units to meet the mechanical requirements of IECC commercial code	Pass*
R403.9	Snow melt and ice system controls installed where applicable	Pass*
R403.10	Pools and permanent spa energy consumption meet requirements for heaters, time clocks and covers	Pass*
R403.11	Portable spas meet the requirements of APSP-14.	Pass*
R404.1	High efficacy lights installed in 75% of permanently installed fixtures.	Pass

\* This is a projected rating. These items must eventually be field-verified by the Rater, Field Inspector, Code Inspector, or Builder.

#### Ekotrope RATER - Version 4.2.2.3561

IECC 2015 ERI compliance results calculated using Ekotrope RATER's energy and code compliance algorithm. Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users. Ekotrope disclaims all liability for the information shown on this report.



# Knoxville

Knoxville, IA 50138

Builder:

**This report is based on a proposed design and does not confirm field enforcement of design elements.**

## THIS HOME IS CERTIFIED TO MEET THE 2015 INTERNATIONAL ENERGY CONSERVATION CODE

### Building Features

<b>Ceiling</b> Attic, R-49	<b>Duct</b> Supply R-0.0, Return R-0.0
<b>Above Grade Walls</b> R-19	<b>Duct Leakage to Outside</b> Untested Forced Air
<b>Foundation Walls</b> N/A	<b>Total Duct Leakage</b> 25 CFM @ 25Pa (Rough-In, with Air Handler)
<b>Framed Floor</b> R-19	<b>Heating</b> Air Source Heat Pump • Electric • 7.8 HSPF2
<b>Slab</b> N/A	<b>Cooling</b> Air Source Heat Pump • Electric • 15.2 SEER2
<b>Infiltration</b> 3 ACH50	<b>Water Heating</b> Residential Water Heater • Electric • 0.92 Energy Factor
<b>Window</b> U-Value: 0.29, SHGC: 0.27	

As a 3rd party extension of the code jurisdiction utilizing these reports, I certify that this energy code compliance document has been created in accordance with the requirements of Chapter 4 of the adopted International Energy Conservation Code based on MARION County. If rating is Projected, I certify that the building design described herein is consistent with the building plans, specifications, and other calculations submitted with the permit application. If rating is Confirmed, I certify that the address referenced above has been inspected/tested and that the mandatory provisions of the IECC have been installed to meet or exceed the intent of the IECC or will be verified as such by another party.

Name: Erik Henson  
Organization: Midwest Energy Consultants

Signature: *Erik Henson*  
Digitally signed: 2/1/25 at 8:12 PM

Ekotrope RATER - Version 4.2.2.3561

2015 IECC compliance results calculated using Ekotrope RATER's energy and code compliance algorithm.  
Ekotrope RATER is a RESNET Accredited HERS Rating Tool. All results are based on data entered by Ekotrope users.  
Ekotrope disclaims all liability for the information shown on this report.



# IECC 2015 Label

## *Knoxville*

Ekotrope RATER - Version: 4.2.2.3561

### **Building Envelope Specs**

Ceiling: R-49

Above Grade Walls: R-19

Foundation Walls: N/A

Exposed Floor: R-19

Slab: N/A

Infiltration: 3 ACH50

Duct Insulation: Supply: R0, Return: R0

Duct Lkg to Outdoors: Untested Forced Air

### **Window & Door Specs**

U-Value: 0.29, SHGC: 0.27

Door: R-7

### **Mechanical Equipment Specs**

Heating: Air Source Heat Pump • Electric • 7.8 HSPF2

Cooling: Air Source Heat Pump • Electric • 15.2 SEER2

Hot Water: Residential Water Heater • Electric • 0.92

Energy Factor

Average Mechanical Ventilation: 48.3 CFM

### **Builder or Design Professional**

Signature: \_\_\_\_\_