

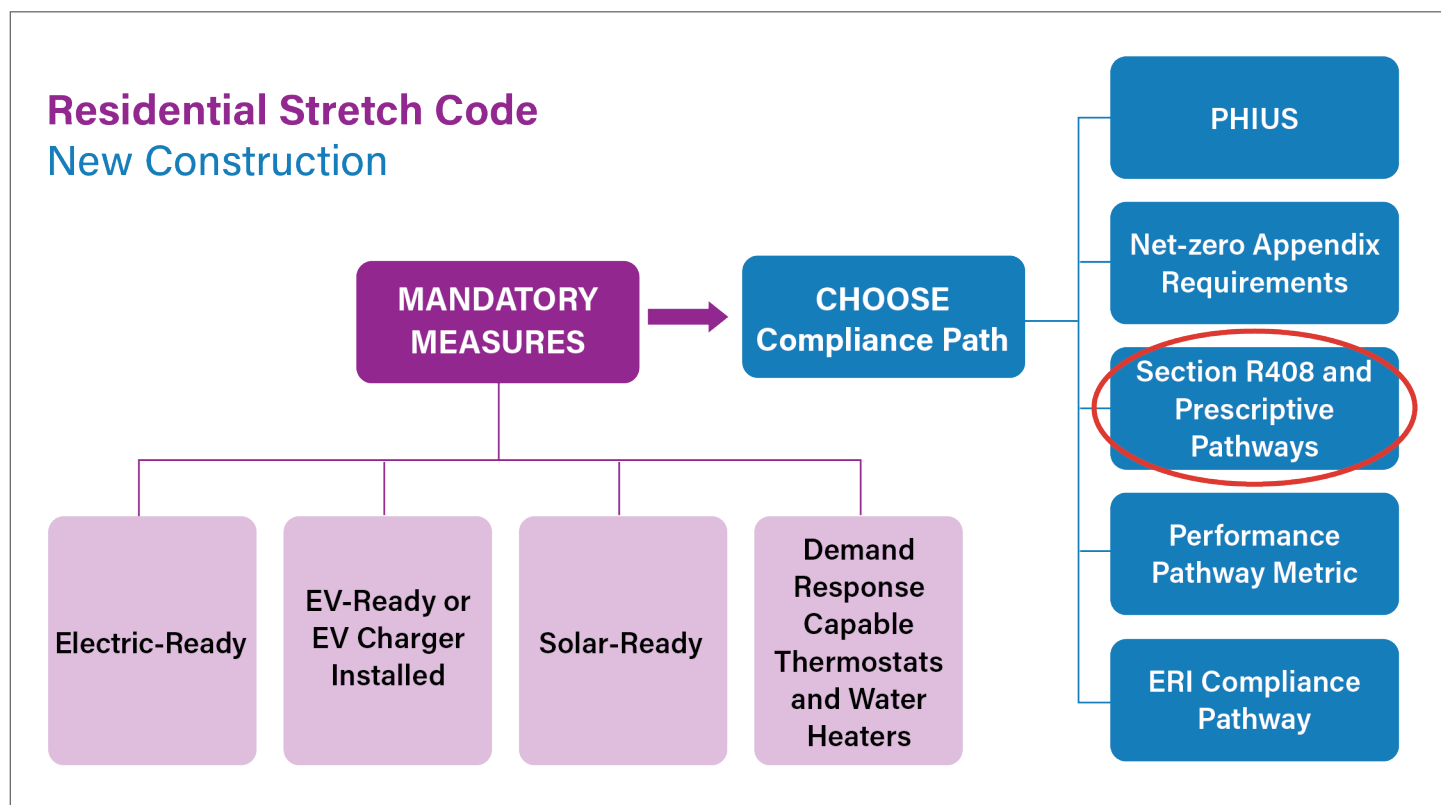
Field Guide—Section R408 of the Illinois Residential Stretch Code: Additional Efficiency Requirements

The **2023 Illinois Residential Stretch Code** offers **five pathways** through which a building can comply with code requirements. Projects using the **Prescriptive Compliance Pathway** must meet the Additional Efficiency Requirements described in Section R408.

Design teams may choose **one of two options** to achieve prescriptive compliance: **1) R408.2** (heat pumps and building envelope air tightness); or **2) R408.3** (30 additional efficiency credits).

This resource is meant to assist code officials and residential building design professionals in understanding the two options that Section R408 provides. This document is not comprehensive; please reference code language to ensure compliance.

Figure 1: Paths to Residential Stretch Code Compliance



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The sections below detail the requirements for each compliance option. **Option One** (heat pump equipment and building envelope air tightness) may be ideal for a building which desires a straightforward, pre-packaged pathway to code compliance. This option requires use of an electric heat pump and a heat pump water heater along with a tighter building envelope for optimal efficiency.

For buildings whose design prevents the use of electric heat pumps for space heating and water heating, **Option Two** (additional efficiency credits) allows the implementation of high efficiency fossil fuel heating equipment with a combination of additional efficiency measures.

OPTION ONE—R408.2 Heat Pump Equipment and Air Tightness
Projects choosing this path must meet all the requirements in *Table 1*.

Table 1. Option 1 requirements specified in R408.2

Electric heat pump	Install electric heat pump equipment for both heating and cooling. In CZ 5, air-source heat pumps shall meet the following requirements for cold climate heat pumps: ▪ COP at 5°F (-15°C) ≥ 1.75 ▪ Percent of heating capacity at 5°F (-15°C) ≥ 70% of that at 47°F (8.34°C)
Heat pump water heater	Install a heat pump water heater for water heating equipment.
Building envelope	Achieve a measured air leakage that is less than or equal to 2.0 ACH50 for the building envelope.
ERV or HRV	Install either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) with a sensible heat recovery efficiency (SRE) no less than 70 percent at 32°F (0°C) at an airflow greater than or equal to design airflow. The SRE shall be determined from a listed value or from interpolation of listed values. <i>Construction documents shall include documentation of the SRE.</i>

OPTION TWO—Additional Efficiency Credit Requirements
R408.3 Additional energy efficiency credit requirements option

If a building does not install heat pumps for space heating and for water heating as specified in R408.2, it may comply with the residential stretch code by incorporating additional efficiency measures. Projects using Option 2 must include at least two efficiency measures that collectively earn at least 30 credits (dwelling units with ≥5,000 square feet of living area above grade plane must meet 35 credits). Credits can be chosen from all available credit options.

Credit values are listed in the far-right columns in the tables below. The Climate Zone (CZ) refers to the IECC-established climate zones. Northern Illinois is in Climate Zone 5.

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Envelope Credits (R408.3.1)

To achieve building envelope credits, choose either Enhanced envelope performance UA or Improved fenestration. UA refers to the total heat loss of the building envelope, calculated using $U\text{-factor} \times \text{Area}$.

Enhance envelope performance UA

Table 2. Envelope performance credits as specified in R408.3.1.1

Reduction in heat transmission, as dictated by (Area) x (U-factor)	Reduction in total UA from reference home	CZ 5
	≥2.5%	1
	≥5%	3
	≥7.5%	3

OR—Improved fenestration

Table 3. Fenestration credits as specified in R408.3.1.2

	CZ 5
Vertical fenestration U-factor ≤0.22	4

HVAC Credits (R408.3.2)

To achieve HVAC credits, the building's heating and cooling system must meet the efficiency standards in **Table 4**.

A building can earn credits in multiple non-overlapping categories; however, a project cannot receive multiple credits for the same category.

Table 4. HVAC performance credits as specified in R408.3.2

Category	Measure	CZ 5
High performance cooling system	≥ 16.9 SEER2 and 13.4 EER2 air conditioner	3
	≥ 15.2 SEER2 and 10 EER2 air conditioner	2
High performance gas furnace	≥ 96 AFUE natural gas furnace	7
	≥ 92 AFUE natural gas furnace	5
High performance electric heat pump system	≥ 8.5HSPF2/16.9 SEER2 electric air source heat pump	32
	≥ 8.1HSPF2/16 SEER2 electric air source heat pump	31
Ground source heat pump	≥ 3.5 COP ground source heat pump	33
High performance gas heat pump space heating system	≥ 140 AFUE gas heat pump space heating system (shall not be configured to provide cooling)	16
	≥ 120 AFUE gas heat pump space heating system (shall not be configured to provide cooling)	11

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Water Heating Credits (R408.3.3)

To achieve water heating credits, the building's hot water system must meet the standards in **Table 5**.

Table 5. Water heating performance credits as specified in R408.3.3

Category	Measure	CZ 5
Fossil fuel service water heating	≥0.82 UEF fossil-fuel service water-heating system	2
High performance heat pump water heating system	≥2.9 UEF electric service water-heating system	6
Solar hot water heating system	≥3.00 SUEF for solar water heating with electric backup or ≥1.80 SUEF for solar water heating with gas backup.	6
Compact hot water distribution	Maximum water volume of 16oz in the closest source of heated water and the fixture supply pipe. <i>Note: Please reference R408.3.3.1- R408.3.3.2 to correctly determine water volume.</i>	2

Duct Thermal Distribution Credits (R408.3.4)

To achieve duct credits, the building's thermal distribution system must meet the standards in **Table 6**.

Table 6. Duct thermal distribution credits as specified in R408.3.4

Credit Requirement	CZ 5
100% of ductless thermal distribution system or hydronic thermal distribution system located completely inside the building thermal envelope	12
100% of duct thermal distribution system located in conditioned space	13
Total duct leakage meets minimum standards: 1. ≤2.0 cubic feet/minute/100 square feet of conditioned floor area when air handler is installed at time of testing 2. ≤1.75 cubic feet/minute/100 square feet of conditioned floor area when air handler is installed at time of testing	5

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Air Sealing and Ventilation Credits (R408.3.5)

To achieve credits, both the building's air leakage and ventilation system must meet one of the standards in **Table 7**.

Table 7. Air sealing and ventilation credits as specified in R408.3.5

Credit Requirement	CZ 5
≤1 ACH50 air leakage rate with ERV or HRV installed	17
≤1.5 ACH50 air leakage rate with ERV or HRV installed	15
≤2 ACH50 air leakage rate with ERV or HRV installed	13
≤2 ACH50 air leakage rate with balanced ventilation	5

Energy Efficient Appliances (R408.3.6)

To achieve credit, all three appliance types must meet efficiency standards.

Table 8. Energy efficient appliance credits as specified in R408.3.5

Appliance Type	Measure	CZ 5
Refrigerator	Maximum Annual Energy Consumption (AEC) ≤620kWh/yr	1
Dishwasher	Maximum AEC ≤240kWh/yr	
Clothes washer and dryer	In unit: AEC ≤130 kWh/yr, Integrated Modified Efficiency Factor (IMEF) greater than 1.84 cu ft/kWh/cycle Shared: IMEF greater than 2.0 cu ft/kWh/cycle	

FOR ADDITIONAL INFORMATION on this document or stretch code documents, please contact:
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