Comparison of IL Residential Energy Code (2021 IECC) and IL Residential Stretch Code (2021 IECC with amendments)

The Illinois Capital Development Board has published a stretch code for municipalities to adopt. The following tables summarize the differences between the current Illinois residential base energy code (which uses the 2021 International Energy Conservation Code (IECC) with weakening amendments) and the Illinois residential stretch code (2021 IECC with strengthening amendments).

Figure 1 illustrates the components of the residential stretch code, including the mandatory elements and the compliance paths from which builders can choose. The stretch code offers five different compliance paths.

Figure 1. Residential Stretch Code Compliance Paths

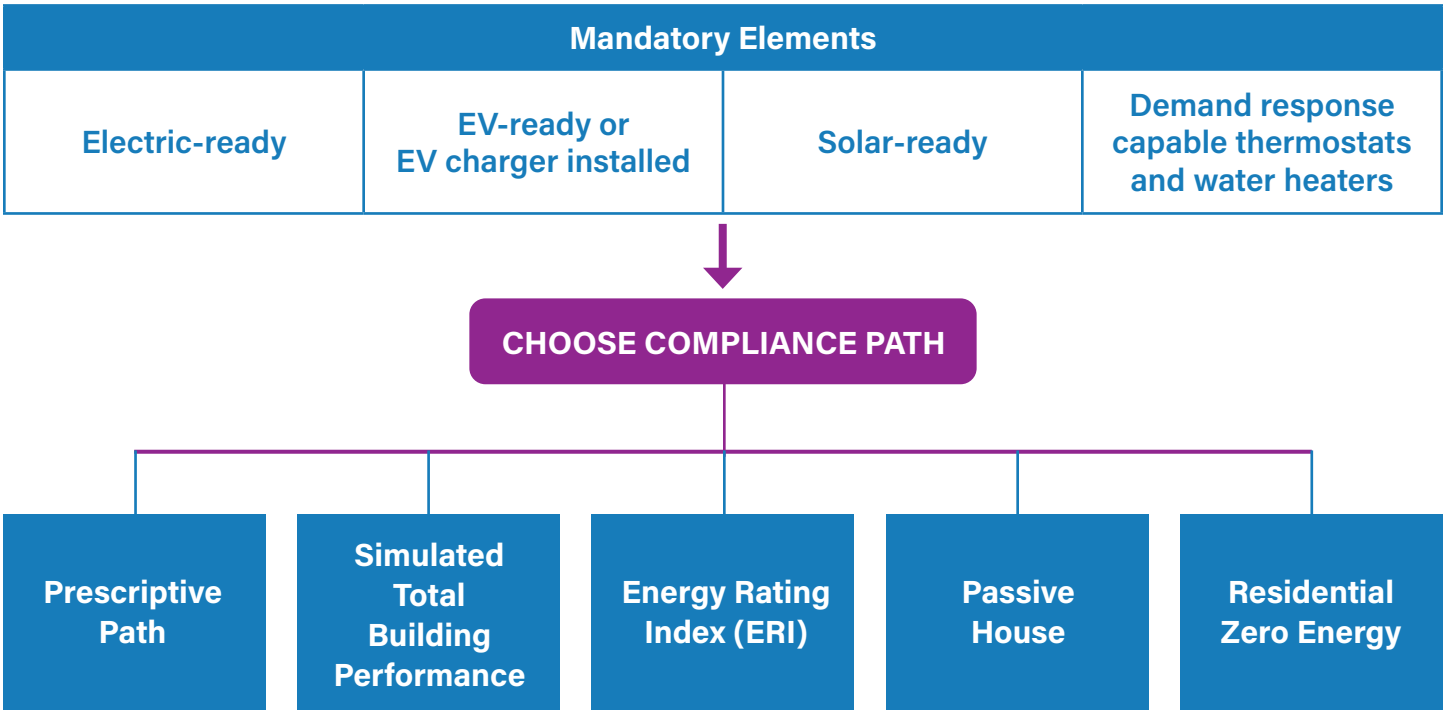

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Table 1 lists each compliance path and what is required under base and stretch codes. The stretch code has several paths that are not available under base code, including the Passive House Path and Residential Zero Energy Path.

Table 1. Residential compliance paths: base energy code compared to stretch energy code

COMPLIANCE PATH OPTIONS (Meet all Mandatory Elements, then choose ONE Compliance Path)		
COMPLIANCE PATH	**IL BASE ENERGY CODE**	**IL STRETCH ENERGY CODE**
Prescriptive Path	2021 IECC (slightly weakened)	Strengthened to meet CEJA* targets; more stringent than 2021 IECC
Simulated Total Building Performance Path	2021 IECC	Revised to be based on a Site Energy metric instead of utility cost to align with CEJA targets; more stringent than 2021 IECC
Energy Rating Index (ERI) Path	2021 IECC	Aligned ERI ventilation calculation and ERI metric with CEJA targets; more stringent than 2021 IECC
Passive House Path	Not Available	Certify to PHIUS or PHI; more stringent than 2021 IECC and CEJA targets
Residential Zero Energy Path	Not Available	Maximum ERI of 46 (~50% more efficient than 2006 IECC reference design) if no on-site power and ERI of zero (net-zero energy) when combined with on-site power. R 406 backstop applies. Exceeds 2021 IECC and CEJA targets.

**CEJA—Illinois Climate and Equitable Jobs Act*

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Table 2 outlines the requirements that apply across all compliance paths and shows how those requirements are defined under the base and stretch codes. As the table indicates, most requirements are similar across the two for the measures shown. The stretch code adds EV-readiness, solar-readiness, electric-readiness, and demand response measures. Tables 3, 4, and 5 include comparison for each path available in both the base and stretch code: prescriptive path, simulated total building performance path, and ERI path.

Table 2. Overall requirements for all compliance paths: base energy code compared to stretch energy code

REQUIREMENT	IL BASE ENERGY CODE	IL STRETCH ENERGY CODE
Blower Door Test	Required	
Duct Testing	All ducts must be tested for tightness	
Duct Tightness	**Unconditioned:** Must meet 4 cfm/100 sq ft | **Conditioned:** Must meet 8 cfm/100 sq ft	
Duct Insulation	Min. **R-8** for ducts 3 inches and larger | Min. **R-6** for ducts smaller than 3 inches	
Cavities as Ducts	Not allowed for supply or return ducts	
Min. Piping Insulation	R-3	
Ventilation	Comply with M15050 or IRC or IMC	
Ventilation Fan Efficiency	Comply with Table R403.6.2	
High Efficacy Lighting	100%; controls for permanent fixtures required	
EV-readiness	Not required	Single-family (sf) homes required to be EV-ready or EV charger-installed; Multi-family (MF) residential buildings must comply w/ commercial stretch code EV infrastructure requirements.
Solar-readiness	Not required	SF homes required to be solar-ready; MF buildings must comply w/ commercial stretch code solar readiness and installation requirements.
Electric-readiness	Not required	Mixed-fuel residential buildings required to be electric-ready for water heating, space heating, cooking and clothes drying.
Demand Response	Not required	Demand-response-capable thermostats and water heaters required

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Table 3 compares the requirements for the prescriptive paths in the base and stretch codes. As shown in the table, the stretch code requires a stronger thermal envelope and encourages installation of heat pumps.

Table 3. Prescriptive Path (Sections R401-R404 (2021 IECC) and R408 (2024 IECC)) requirements: base energy code compared to stretch energy code

REQUIREMENT	IL BASE ENERGY CODE	IL STRETCH ENERGY CODE
Maximum Envelope Air Infiltration	3 ACH50	
Wood Frame Wall Min. R-Value	20+5ci or 13+10ci or 20ci	
Wood Frame Wall Max. U-Factor	0.045	
Floor Min. R-Value	CZ 4: R-19 | CZ 5: R-30	
Floor Max. U-Factor	CZ 4: 0.047 | CZ 5: 0.033	
Foundation Wall Min. Values	CZ 4: R-10ci or 13 | CZ 5: R-15ci or 19 or R-13+5ci	
Basement Wall Max. U-Factor	0.050	
Roof/Ceiling Insulation Min. R-Value	R49	R60
Roof/Ceiling Max. U-Factor	0.026	0.024
Fenestration Max. U-Factor	Maximum 0.30	
Additional Compliance Package	Must choose one 5% additional efficiency package from Section R408 (2021 IECC)	Achieve **30 energy credits** from modified Section R408 (taken from 2024 IECC) **OR** Install electric heat pump for heating and cooling with a measured air leakage less than or equal to 2.0 ACH50, and an efficient Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV).

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Table 4 includes the requirements for the performance path and compares base and stretch code.

Table 4. Simulated Total Building Performance Path (Section R405): base energy code compared to stretch energy code

REQUIREMENT	IL BASE ENERGY CODE	IL STRETCH ENERGY CODE
Total Performance Requirement	Requirements in R405.2; Annual energy cost must be less than or equal to *standard reference design*	Performance compliance based on site energy rather than energy costs. The site energy use of the proposed design shall be less than or equal to 71% of the site energy use of the *standard reference design*.
Maximum Air Infiltration	5 ACH50—Improved air tightness can be traded, or counted for R408	5 ACH50—Improved air tightness can be traded
Backstop Levels	2009 IECC Prescriptive	Prescriptive U-factors from Table R402.1.2 multiplied by 1.10 in accordance with Equation 4-1
Ceiling U-Factor Backstop	Maximum 0.026	Varies (Table R402.1.2 multiplied by 1.10 in accordance with Equation 4-1)
Wood Frame Wall U-Factor Backstop	Maximum 0.057	
Basement Wall U-Factor Backstop	Maximum 0.050	
Fenestration U-Factor Backstop	Maximum 0.350	
Additional Compliance Package	Must choose one 5% additional efficiency package from R408 (without including it in proposed design) OR proposed design must achieve 95% of annual energy cost of reference design	Not available in this path. *Due to the deletion of R401.2.5, the Whole Building Performance path has no additional requirements for efficiency (beyond changing the metrics for calculations)*
Reference Design	Air leakage at 3 ACH50	Air leakage at 3 ACH50; The mechanical ventilation rates used for the purpose of determining the UA shall not be construed to establish minimum ventilation requirements for compliance with this code.

Comparison of IL Residential Energy Code (2021 IECC) and IL Residential Stretch Code (2021 IECC with amendments)

Table 5 includes the requirements for the ERI path and compares base and stretch code requirements under the path.

Table 5. ERI Path (Section R406): base energy code compared to stretch energy code

REQUIREMENT	IL BASE ENERGY CODE	IL STRETCH ENERGY CODE	
Maximum Envelope Air Infiltration	5 ACH50 Improved air tightness can be traded		
HERS Index Minimum	CZ 4: 54 CZ 5: 55	**Without combustion equipment** CZ 4: 54 CZ 5: 55	**With combustion equipment** CZ 4: 51 CZ 5: 50
With On-site Renewables	Proposed thermal envelope must be less than/equal to UA Maximum 5% of EE tradeoff; RECs allowed	Proposed total building thermal envelope UA must be less than/equal to total building thermal envelope UA using prescriptive U-factors from Table R402.1.2 multiplied by 1.10 in accordance with Equation 4-1 RECs allowed	
Without On-site Renewables	Proposed thermal envelope must be less than/equal to UA x 1.15		
Calculation Standard	RESNET/ICC 300; EV's not included	ANSI/RESNET/ICC 300; EV's not included. The mechanical ventilation rates used for the purpose of determining the ERI shall not be construed to establish minimum ventilation requirements for compliance with this code.	
Additional Compliance Package	Must achieve 5% higher energy efficiency than ERI listed above	Not available for this compliance path. *According to the deletion of R401.2.5, the ERI path has no additional requirements for efficiency (beyond changing the metrics for calculations)*	