NYStretch Energy Code 2023

Residential Draft

*Draft V2.0 For Public Comment*

VERSION 2.0:

A Supplement to the 2021 International Energy Conservation Code and

ASHRAE Standard 90.1-2019

Published by the New York State Energy Research and Development Authority

*DATE, 2022*

INTRODUCTION

The NYStretch Energy Code-2023 project was undertaken by New York State Energy Research and Development Authority (NYSERDA) to develop a pivotal tool for New York jurisdictions to support the State’s energy and climate goals by providing greater savings over the State Energy Conservation Construction Code (the “State Energy Code”) for both residential and commercial buildings.

The State Energy Code establishes energy conservation standards for the design and construction of all public and private buildings in the State. The State Energy Code is adopted by the State Fire Prevention and Building Code Council (the “Code Council”) pursuant to Article 11 of the Energy Law and is applicable in all parts of the State. However, Article 11 of the Energy Law authorizes municipalities to adopt local energy conservation construction codes (“Local Energy Codes”) that are more stringent than the State Energy Code.

NYSERDA developed a publication entitled NYStretch Energy Code-2023, Version 2.0 (“NYStretch”) that makes changes to certain provisions in the 2021 International Energy Conservation Code (2021 IECC) and ASHRAE 90.1-2019 and adds additional energy saving and clean energy provisions. NYSERDA designed NYStretch in a way that allows a municipality to readily adopt a more stringent Local Energy Code by adopting NYStretch as a supplement to the State Energy Code. NYStretch is not intended to be used as a standalone energy code. It was developed with the goal to be:

* Technically sound
* Thoroughly reviewed by stakeholders
* Written in code enforceable language

DISCLAIMER

This is a draft document containing strikethrough/underline language for public comment purposes exclusively. Revisions to Section R404.4 were done in consultation with ASHRAE SSPC 189.1 and provided with permission from ASHRAE. These changes are part of WG07DA23D (Proposed Addendum ac) and are subject to change as they undergo the ASHRAE publication/public review process.

ACKNOWLEDGEMENTS

NYSERDA gratefully thanks and acknowledges the following individuals who contributed to the development of NYStretch Energy Code-2023:

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PART 3

# Amendments to 2021 International Energy Conservation Code Residential Provisions

Preface

This draft NYStretch-2023 code language is based on materials presented to an engaged stakeholder group and feedback was collected in several Advisory Group meetings, Low-Rise Residential Working Group meetings and Subtopic Working Group meetings.

## Addition of New Section R103.2.2 Energy Storage-Ready System

Section R103 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R103.2.2 as follows:

**R103.2.2 Energy storage-ready system.** The construction documents shall provide the location of pathways for routing of raceways or cable from the *energy storage system* to the electrical service panel, from the panelboard to dedicated branch circuits, the location and layout of a designated area for electrical *energy storage system* and system isolation equipment.

## Amendments to Section R105.2.2 Framing and Rough-in Inspection

Section R105.2.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R105.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to: types of insulation and corresponding *R*-values and their correct location and proper installation, *fenestration* properties such as *U*-factor and *SHGC* and proper installation; ~~air leakage controls as required by the code~~ *air barrier,* air sealing and insulation installation inspection in accordance with Section R402.4.1.1; and *approved* plans and specifications.

## Addition of New Section R105.2.5 Electrical Rough-in Inspection

Section R105 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R105.2.5 as follows:

**R105.2.5 Electrical rough-in inspection.** Inspections at electrical rough-in shall verify compliance as required by the code and the *approved* plans and specifications as to the locations, distribution, and capacity of the electrical system. Where the energy storage system area is not in the same space as the electrical panel, inspections shall verify conduit or pre-wiring from the energy storage ready zone to the electrical panel.

## Amendments to Section R202 General Definitions

Section R202 of the 2021 IECC Residential Provisions shall be amended by the addition of new definitions as follows:

**AUTOMOBILE PARKING SPACE.** A space within a *building* or private or public parking lot, exclusive of driveways, ramps, columns, office and work areas, for the parking of an automobile.

**CHI-FACTOR (χ-FACTOR).** The heat loss factor for a single thermal bridge characterized as a point element of a *building thermal envelope* (Btu/h x oF) [W/K].

**CLEAR FIELD THERMAL BRIDGE.** An area-based thermal transmittance associated with elements of a building envelope assembly which repeats at regular intervals. Examples of clear field thermal bridges include metal or wood studs, brick ties, and cladding attachments such as z-girts.

**CLEAR FIELD U-FACTOR.** Thermal performance factor that accounts for clear field thermal bridge.

**DEMAND RESPONSIVE CONTROL.** A control capable of receiving and automatically responding to a demand response signal.

**DEMAND RESPONSE SIGNAL.** A signal that indicates a price or a request to modify electricity consumption for a limited time period.

**ELECTRIC VEHICLE (EV).** An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** Equipment for plug-in power transfer including the ungrounded, grounded and equipment grounding conductors, and the *electric vehicle* connectors, attached plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the *electric vehicle.*

**ELECTRIC VEHICLE READY SPACE (EV READY SPACE).** An *automobile parking space* that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed *EVSE*.

**ENERGY STORAGE SYSTEM (ESS).** One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

**OVERALL U-FACTOR.** U-factor of *above grade walls* that includes clear field, linear, and point thermal bridges.

**POTENTIAL SOLAR ZONE AREA.** The combined area of any low-sloped roofs and any steep-sloped roofs oriented between 90 degrees and 300 degrees of true north where the annual solar access is 70 percent or greater. Annual solar access is the ratio of “annual solar insolation with shade” to the “annual solar insolation without shade”. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

**PSI-FACTOR (ψ-FACTOR).** The heat loss factor per unit length of a thermal bridge characterized as a linear element of a *building thermal envelope* (Btu/h x ft x oF)[W/(m x K)].

**THERMAL BRIDGES*.*** An element or interface of elements that has higher thermal conductivity than the surrounding *building thermal envelope*, which creates a path of least resistance for heat transfer.

## Amendments to Section R401.2 Compliance

Section R401.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R401.2 Application**. *Residential buildings* shall comply with ~~Section R401.2.5 and~~ ~~either~~ Sections R401.2.1, R401.2.2, or R401.2.3.

**Exception:** Additions, *alterations*, repairs and changes of occupancy to existing buildings complying with Chapter 5.

**R401.2.1 Prescriptive Compliance Option.** The prescriptive compliance option requires compliance with Sections R401 through R404 and R408.

**R401.2.2 Total Building Performance Option.** The total building performance option requires compliance with Section R405.

**R401.2.3 Energy Rating Index Option.** The Energy Rating Index (ERI) option requires compliance with Section R406.

Section R401.2.5 of the 2021 IECC Residential Provisions shall be deleted:

**~~R401.2.5 Additional energy efficiency.~~** ~~This section establishes additional requirements applicable to all compliance approaches to achieve additional energy efficiency.~~

~~1. For buildings complying under Sections R401 through R404, one of the Additional Efficiency~~  ~~Package Options shall be installed according to Section R407.2.~~

~~2. For buildings complying under the simulated performance alternative in Section R405, the~~  ~~building shall meet one of the following:~~

~~2.1. One of the Additional Efficiency Package Options in Section R407.2 shall be installed~~  ~~without including such measures in the proposed design under Section R405; or~~

~~2.2. The proposed design of the building under Section R405.3 shall have an annual~~  ~~energy cost that is less than or equal to 95 percent of the annual energy cost of the~~  ~~standard reference design.~~

~~3. For buildings complying under the energy rating index alternative in Section R406, the energy rating index value shall be at least 5 percent less than the energy rating index target specified in Table R406.4.~~

~~The option selected for compliance shall be identified in the Certificate required by Section R401.3.~~

## Amendments to [NY] Table R402.1.2 Maximum Assembly U-factors and Fenestration Requirements

[NY] Table R402.1.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Climate Zone** | **Fenestration U-factor** | **Skylight U-factor** | **Ceiling U-factor** | **Frame Wall U-factor** | **Mass Wall U-factorb** | **Floor U-factor** | **Basement Wall U-factor** | **Crawl Space Wall U-factor** |
| 4 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.024 | 0.040  ~~0.045~~ | 0.045  ~~0.098~~ | 0.031  ~~0.047~~ | 0.045  ~~0.059~~ | 0.045  ~~0.065~~ |
| 5 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.024 | 0.040  ~~0.045~~ | 0.045  ~~0.082~~ | 0.031  ~~0.033~~ | 0.045  ~~0.050~~ | 0.045  ~~0.055~~ |
| 6 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.024 | 0.040  ~~0.045~~ | 0.045  ~~0.060~~ | 0.031  ~~0.033~~ | 0.045  ~~0.050~~ | 0.045  ~~0.055~~ |

1. Nonfenestration U-factors shall be obtained from measurement, calculation or an *approved* source.
2. Mass wall shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall U-factor shall not exceed 0.045.~~0.087 in Climate Zone 4, 0.065 in Climate Zone 5, and 0.057 in Climate Zone 6.~~

## Amendments to [NY] Table R402.1.3 – Insulation Minimum R-values and Fenestration Requirements by Component

[NY] Table R402.1.3 of the 2021 IECC Residential Provisions shall be amended to read as follows:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Climate Zone** | **Fenestration U-factorb** | **Skylight U-factorb** | **Glazed fenestration SHGCb** | **Ceiling R-Value** | **Wood Frame Walle**  **R-Value** | **Mass Wallf**  **R-Value** | **Floor**  **R-Value** | **Basement Wallc,e**  **R-Value** | **Slabd**  **R-Value and Depth** | **Crawl Space Wallc,e**  **R-Value** |
| 4 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.25~~0.40~~ | 60 | 34 or 20+9ci or 0+22ci  ~~20+5 or 13+10 or 0+15~~ | 20/24~~8/13~~ | 32  ~~19~~ | 30 or 0+20ci or 15 + 9ci  ~~10ci or 13~~ | 12ci, 4 ft.  ~~10ci, 4 ft.~~ | 30 or 0+20ci or 15 + 9ci  ~~10ci or 13~~ |
| 5 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.32~~0.40~~ | 60 | 34 or 20+9ci or 0+22ci  ~~20+5 or 13+10 or 0+15~~ | 20/24~~13/17~~ | 32  ~~30~~ | 30 or 0+20ci or 15 + 9ci  ~~15ci or 19 or 13 + 5ci~~ | 12ci, 4 ft.  ~~10ci, 4 ft.~~ | 30 or 0+20ci or 15 + 9ci  ~~15ci or 19 or 13 + 5ci~~ |
| 6 | 0.23  ~~0.30~~ | 0.30  ~~0.55~~ | 0.36  ~~NR~~ | 60 | 34 or 20+9ci or 0+22ci  ~~20+5 or 13+10 or 0+20~~ | 20/24  ~~15/20~~ | 32  ~~30~~ | 30 or 0+20ci or 15 + 9ci  ~~15ci or 19 or 13 + 5ci~~ | 12ci, 4 ft.  ~~10ci, 4 ft.~~ | 30 or 0+20ci or 15 + 9ci  ~~15ci or 19 or 13 + 5ci~~ |

~~NR = Not Required~~

For SI: 1 foot = 304.8 mm.

1. *R-*values are minimums. *U*-factors and *SHGC* are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
2. The *fenestration U*-factor column excludes skylights. The *SHGC* column applies to all glazed f*enestration*.
3. “30 or 0+20ci or 15+9ci" means R-30 *cavity insulation* on the interior side of the wall; or R-20 *continuous insulation* (ci) on the interior or exterior surface of the wall; or R-15 *cavity insulation* on the interior of the wall in addition to R-9 *continuous insulation* on the interior or exterior surface of the wall. ~~"10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.~~
4. R-15~~R-5~~ *continuous insulation* shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs as indicated in the table. The slab edge insulation for heated slabs shall not be required to extend below the slab.
5. The first value is *cavity insulation*, the second value is *continuous insulation.* Therefore, as an example, “20+9ci~~13+5~~” means R-20~~R-13~~ *cavity insulation* plus R-9~~R-5~~ *continuous insulation.*
6. Mass walls shall be in accordance with Section R402.2.5. The second *R*-value applies when more than half the insulation is on the interior of the mass wall.

## Amendments to [NY] Table R402.2.6 – Steel-frame Ceiling, Wall And Floor Insulation R-values

[NY] Table R402.2.6 of the 2021 IECC Residential Provisions shall be amended to read as follows:

|  |  |
| --- | --- |
| **WOOD FRAME** **R-VALUE** **REQUIREMENT** | **COLD-FORMED STEEL-FRAME** **EQUIVALENT R-VALUEa** |
| **Steel Truss Ceilingsb** | |
| R-30 | R-38 or R-30 + 3 or R-26 + 5 |
| R-38 | R-49 or R-38 + 3 |
| R-49 | R-60 or R-38 + 5 |
| R-60 | R-66 or R-49 + 5 |
| R-66 | R-60 + 5 or R-49 + 10 |
| **Steel Joist Ceilingsb** | |
| R-30 | R-38 in 2 × 4 or 2 × 6 or 2 × 8 R-49 in any framing |
| R-38 | R-49 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10 |
| R-49 | R-60 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10 |
| R-60 | R-66 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10 |
| R-66 | R-74 in 2 × 4 or 2 × 6 or 2 × 8 or 2 × 10 |
| **Steel-Framed Wall, 16 inches on center** | |
| R-13 | R-13 + 4.2 or R-21 + 2.8 or R-0 + 9.3 or R-15 + 3.8 or R-21 + 3.1 |
| R-13 + 3 | R-0 + 11.2 or R-13 + 6.1 or R-15 + 5.7 or R-19 + 5.0 or R-21 + 4.7 |
| R-34~~20~~ | ~~R-0 + 14.0 or~~ R-20~~13~~ + 14~~8.9~~ ~~or R-15 + 8.5~~ or R-30~~19~~ + 9~~7.8~~ or R-34~~21~~ + 7.5 |
| R-20 + 9~~5~~ | R-13 + 16~~2~~.7 or R-15 + 16~~2~~.3 or R-19 + 15~~1~~.6 or R-21 + 15~~1~~.3 or R-25 + 14~~0~~.9 |
| R-0 + ~~R-~~22~~1~~ | R-0 + 27~~14.6~~ or R-13 + 10~~9.5~~ or R-15 + 10~~9~~.1 or R-19 + 9~~8~~.4 or R-21 + 9~~8~~.1 or R-25 + 8~~7~~.7 |
| **Steel Framed Wall, 24 inches on center** | |
| R-13 | R-0 + 9.3 or R-13 + 3.0 or R-15 + 2.4 |
| R-13 + 3 | R-0 + 11.2 or R-13 + 4.9 or R-15 + 4.3 or R-19 + 3.5 or R-21 + 3.1 |
| R-34~~20~~ | ~~R-0 + 14.0 or~~ R-20~~13~~ + 13~~8.9~~ ~~or R-15 + 8.5~~ or R-28~~19~~ + 9~~7.8~~ or R-34~~21~~ + 5.9~~7.5~~ |
| R-20 + 9~~5~~ | R-13 + 16~~1~~.5 or R-15 + 15~~0~~.9 or R-19 + 15~~0~~.1 or R-21 + 14~~9~~.7 or R-25 + 14~~9~~.1 |
| R-0 + ~~R-~~22~~1~~ | R-0 + 15~~4~~.6 or R-13 + 9~~8~~.3 or R-15 + 8~~7~~.7 or R-19 + 7~~6~~.9 or R-21 + 7~~6~~.5 or R-25 + 6~~5~~.9 |
| **Steel Joist Floor** | |
| R-13 | R-19 in 2 × 6, or R-19 + 6 in 2 × 8 or 2 × 10 |
| R-19 | R-19 + 6 in 2 × 6, or R-19 + 12 in 2 × 8 or 2 × 10 |
| R-32 | R-19 + 10 in 2 × 6, or R-19 + 15 in 2 × 8 or 2 × 10 |

1. The first value is *cavity insulation* *R*-value, the second value is *continuous insulation* *R*-value. Therefore, for example, "R-30+3" means R-30 c*avity insulation* plus R-3 *continuous insulation*.
2. Insulation exceeding the height of the framing shall cover the framing.

## Amendments to Section R402.4.1.1 Installation

Section R402.4.11 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R402.4.1.1 Installation.** The components of the *building thermal envelope* as indicated in Table R402.4.1.1 shall be installed in accordance with the manufacturer’s instruction and the criteria indicated in Table R402.4.1.1 as applicable to the method of construction. Where required by the *code official*, an *approved agency* shall inspect all components and verify compliance. The inspection shall include an open wall visual inspection of all components included in Table R402.4.1.1.

The portion of Table R402.4.11 of the 2021 IECC Residential Provisions titled “General requirements” shall be amended to read as follows:

**TABLE R402.4.1.1**

**AIR BARRIER AND INSULATION INSTALLATION**

|  |  |  |
| --- | --- | --- |
| **COMPONENT** | **AIR BARRIER CRITERIA** | **INSULATION INSTALLATION CRITERIA** |
| General requirements | A *continuous air barrier* shall be installed in the building envelope.  The exterior thermal envelope contains a *continuous air barrier*.  Breaks or joints in the *air barrier* shall be sealed. | Air-permeable insulation shall not be used as a sealing material.  Insulation shall be installed so that the insulation material uniformly fills each cavity side-to-side and top-to-bottom, without substantial gaps or voids around obstructions, and is split, installed, or fitted tightly around wiring and other penetrations in the cavity.  No more than 2% of the total insulated area shall be compressed below the thickness required to attain the *labeled* *R*-value or contain gaps or voids in the insulation. |

## Amendments to Section R402.4.1.2 Testing

Section R402.4.1.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R402.4.1.2 Testing.** The *building* or *dwelling unit* shall be tested for air leakage in accordance with Sections R402.4.1.2.1 and R402.4.1.2.2. Mechanical *ventilation* shall be provided in accordance with Section M1505 of the Residential Code of New York State or Section 403.3.2 of the Mechanical Code of New York State, as applicable, or with other *approved* means of *ventilation*. ~~The maximum air leak- age rate for any building or dwelling unit under any compliance path shall not exceed 5.0 air changes per hour or 0.28 cubic feet per minute (CFM) per square foot [0.0079 m~~~~3~~~~/(s × m~~~~2~~~~)] of dwelling unit enclosure area. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope have been sealed.~~

**Exceptions:**

* 1. For attached *dwelling units*, alternative testing is permitted in accordance with C402.5.3.
  2. For heated, attached private garages and heated, detached private garages accessory to ~~one- and two-family dwellings and townhouses not more than three stories above grade plane in height~~*residential buildings*, building envelope tightness and insulation installation shall be considered acceptable where the items in Table R402.4.1.1, applicable to the method of construction, are field verified. Where required by the *code official*, an *approved* third party independent from the installer shall inspect both *air barrier* and insulation installation criteria. Heated, attached private garage space and heated, detached private garage space shall be thermally isolated from all other habitable, *conditioned spaces* in accordance with Sections R402.2.12 and R402.3.5, as applicable.

**R402.4.1.2.1 Air leakage rate.** The maximum air leakage rate for any *building* or *dwelling unit* under any compliance path shall not exceed 3.0 air changes per hour or 0.16 cubic feet per minute (CFM) per square foot [0.0045 m3/(s × m2)] of *dwelling unit enclosure area*. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals).

**R402.4.1.2.1 Testing procedure.** Testing shall be conducted by an *approved* testing authority. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* have been sealed. The written report shall include:

1. The name and place of business of the party conducting the test;
2. The address of the building that was tested;
3. The *conditioned floor area* of the dwelling, calculated in accordance with ANSI/BOMA Z65.1, except that *conditioned floor area* shall include areas where the ceiling height is less than 5 feet (1524 mm);
4. Measurement of the air volume lost at an internal pressurization of 0.2 inches w.g. (50 Pascals);
5. The date(s) of the test;
6. A certification by the party conducting the test of the accuracy of the test results; and
7. The signature of the party conducting the test.

During testing:

1. Exterior windows and [doors](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#door_access_hatch), fireplace and stove [doors](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#door_access_hatch) shall be closed, but not sealed, beyond the intended weatherstripping or other [*infiltration*](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#infiltration) [control](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#control) measures.
2. Dampers including exhaust, intake, [makeup air](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#makeup_air_dedicated_replacement_air), backdraft and [flue dampers](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#flue_damper) shall be closed, but not sealed beyond intended[*infiltration*](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#infiltration) [control](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#control) measures.
3. Interior [doors](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#door_access_hatch), where installed at the time of the test, shall be open.
4. Exterior or interior terminations for continuous [*ventilation*](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#ventilation) [systems](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#system) and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling [systems](https://up.codes/viewer/new_york_city/nyc-energy-conservation-code-2020/chapter/3/definitions-abbreviations-and-acronyms#system), where installed at the time of the test, shall be turned off.
6. Supply and return registers, where installed at the time of the test, shall be fully open.

**~~Exception:~~** ~~When testing individual dwelling units, an air leakage rate not exceeding 0.30 cubic feet per minute per square foot [0.008 0.0045 m~~~~3~~~~/(s × m~~~~2~~~~)] of the dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pa), shall be an accepted alternative permitted in all climate zones for:~~

1. ~~Attached single-family and multiple-family building dwelling units.~~
2. ~~Buildings or dwelling units that are 1,500 square feet (139.4 m~~~~2~~~~) or smaller.~~

~~Mechanical ventilation shall be provided in accordance with Section M1505 of the International Residential Code or Section R403.3.2 of the International Mechanical Code, as applicable, or with other approved means of ventilation.~~

## Deletion of Section R402.4.1.3 Leakage rate

**~~R402.4.1.3 Leakage rate.~~** ~~When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 0, 1 and 2, and 3.0 air changes per hour in Climate Zones 3 through 8, when tested in accordance with Section R402.4.1.2.~~

## Amendment to Section R402.4.2 Fireplaces

Section R402.4.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R402.4.2 Fireplaces.** New wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. Where using tight-fitting doors on factory-built fireplaces *listed* and *labeled* in accordance with UL 127, the doors shall be tested and *listed* for the fireplace. Fireplaces using *fuel gas* are not permitted in new *buildings*.

## Addition of New Section R402.6 Thermal Bridging Mitigation

Section R402 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R402.6 as follows:

**R402.6** ***Thermal bridge* mitigation.** Projects shall comply with either the criteria indicated in Table R402.6 or the Group R U-factors for Walls, above grade, in Table C402.1.4 calculated in accordance with the thermal bridging requirements of Section C402.6.

**TABLE R402.6**

**THERMAL BRIDGING MITIGATION CRITERIA**

|  |  |
| --- | --- |
| **COMPONENT** | **CRITERIA** |
| Above-grade walls | At *above-grade walls* separating conditioned from unconditioned space, one of the following options shall be used:  *Continuous insulation*  **OR**  Structural insulated panels or; insulated concrete forms or; interior-load bearing double-wall framing.a |
| Thermal envelope | The thermal envelope must be continuous and at least effective R-9 for all components that make up the thermal envelope. |
| Cantilevers and columns | Structural cantilevers and columns shall not penetrate the thermal enclosure.b |
| Girts | No continuous metal girt cladding attachments shall be used. |
| Fenestration | No materials of conductivity with U-factors greater than 0.23 shall bridge from the inside to the outside at windows, doors, or skylights. *Fenestration* metal frames and thresholds shall be thermally broken. |

1. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs, such as offset double-stud walls, aligned double-stud walls with *continuous insulation* between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations. A structural sheathing layer that is more vapor-closed than the exterior sheathing shall be attached to the inner framing.
2. Does not apply to point penetrations for plumbing, electrical, ventilation, makeup air, combustion supply air, and flues/chimneys.

## Amendments to Section R403.1.1 Programmable Thermostat

Section R403.1.1 of the 2021 IECC Residential Provisions shall be amended as follows:

**R403.1.1 Programmable thermostat.** The *thermostat* controlling the primary heating or cooling system of the *dwelling unit* shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day and different days of the week. This *thermostat* shall include the capability to set back or temporarily operate the system to maintain zone temperatures of not less than 55°F (13°C) to not greater than 85°F (29°C). The *thermostat* shall be programmed initially by the manufacturer with a heating temperature setpoint of not greater than 70°F (21°C) and a cooling temperature setpoint of not less than 78°F (26°C). The *thermostat* shall be provided with a *demand responsive control* capable of communicating with the Virtual End Node (VEN) using a wired or wireless bi-directional communication pathway that provides the homeowner the ability to voluntarily participate in utility demand response programs, where available. The *thermostat* shall be capable of executing the following actions in response to a *demand response signal*:

1. Automatically increasing the zone operating cooling set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C), and 4°F (2°C).
2. Automatically decreasing the zone operating heating set point by the following values: 1°F (0.5°C), 2°F (1°C), 3°F (1.5°C), and 4°F (2°C).

*Thermostats* controlling single stage HVAC systems shall comply with Section R403.1.1.1. *Thermostats* controlling variable capacity systems shall comply with Section R403.1.1.2. *Thermostats* controlling multi-stage HVAC systems shall comply with either Section R403.1.1.1 or R403.1.1.2. Where a *demand response signal* is not available the *thermostat* shall be capable of performing all other functions.

**Exception:** Assisted living facilities.

**R403.1.1.1 Single stage HVAC system controls.** *Thermostats* controlling single stage HVAC systems shall be provided with a *demand responsive control* that complies with one of the following:

1. Certified OpenADR 2.0a VEN, as specified under Clause 11, Conformance
2. Certified OpenADR 2.0b VEN, as specified under Clause 11, Conformance
3. Certified by the manufacturer as being capable of responding to a *demand response signal* from a certified OpenADR 2.0b VEN by automatically implementing the control functions requested by the VEN for the equipment it controls
4. IEC 62746-10-1
5. The communication protocol required by a controlling entity, such as a utility or service provider, to participate in an automated demand response program
6. The physical configuration and communication protocol of CTA 2045-A or CTA-2045-B

**R403.1.1.2 Variable capacity and two stage HVAC system controls.** *Thermostats* controlling variable capacity and two stage HVAC systems shall be provided with a *demand responsive control* that complies with the communication and performance requirements of AHRI 1380.

## Amendments to Section R403.3 Ducts

Section R403.3 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.3 Ducts.** *Ducts* and air handlers shall be installed in accordance with Section R403.3.1 through R403.3.~~7~~8, where applicable. The *duct system* in new *buildings* and *additions* shall be located in a *conditioned space*. *Ducts* and air handling equipment shall not be located in ventilated crawlspaces or ventilated attics. If *ducts* are located in crawlspaces or unfinished basements, those areas, including slab foundations, shall be insulated, air sealed, and included as part of the space conditioning load calculations in R403.7.

## Addition of New Section R403.3.8 Duct System Sizing

Section R403.3 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R403.3.8 as follows:

**R403.3.8 Duct system sizing.** *Ducts* shall be sized in accordance with ACCA Manual D based on calculations made in accordance with Sections R403.7 and R403.8.

## Amendments to Section R403.5 Service Hot Water Systems

Section R403.5 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.5 Service hot water systems.** Energy conservation measures for service hot water systems shall be in accordance with Sections R403.5.1 through R403.5.5.

## Amendments to Section R403.5.3 Drain Water Heat Recovery Units

Section R403.5.3 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.5.3 Drain water heat recovery units.** Where installed, drain water heat recovery units shall have a minimum efficiency of 40 percent if installed for equal flow or a minimum efficiency of 52 percent if installed for unequal flow. Vertical drain water heat recovery units shall comply with CSA B55.2~~. Drain water heat recovery units shall~~ and be tested and *labeled* in accordance with CSA B55.1. Sloped drain water heat recovery units may be used when *approved* by the department. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi for individual units connected to three or more showers.  Construction documents shall specify the drain water heat recovery unit efficiency. At the time of inspection, drain water heat recovery units shall be installed.

## Addition of New Section R403.5.4 Supply of Heated Water

Section R403.5 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R403.5.4 as follows:

**R403.5.4 Supply of heated water.** In new *buildings*, heated water supply shall comply with one of the packages listed in Table R403.5.4.

**Table R403.5.4**

**Efficient Supply of Heated Water Packages**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Component** | **Package 1** | **Package 2** | **Package 3** | **Package 4** | **Package 5** |
| Pipe length/pipe volume | Building shall meet R403.5.4.1 or R403.5.4.2 |  | Building shall meet R403.5.4.1 or R403.5.4.2 |  |  |
| Drain water heat recovery |  | Building shall meet R403.5.4.3 |  |  |  |
| Recirculation |  | Building shall meet R403.5.4.4 |  |  |  |
| Plumbing fixtures | Building shall meet R403.5.4.5 | Building shall meet R403.5.4.5 |  | Building shall meet R403.5.4.5 |  |
| Water heater efficiencya |  |  | Hot water system shall have a minimum UEF of 2.9 | Hot water system shall have a minimum UEF of 2.9 | Hot water system shall have a minimum UEF of 3.2 |
| Solar water heating | Solar water heating system shall be designed to meet at least 25% of annual hot water load |  |  |  |  |

1. For packages with requirements for this component, the building construction documents shall specify the water heater equipment type and the minimum equipment efficiency.

**R403.5.4.1 Maximum allowable pipe length method.** The maximum allowable pipe length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length in Table R403.5.4.1. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the piping in Table R403.5.4.1. Construction documents shall specify the pipe length supplying each fixture.

**R403.5.4.2 Maximum allowable pipe volume method.** The water volume in the piping shall be calculated in accordance with Section R403.5.4.2.1. The maximum volume of hot or tempered water in the piping to public lavatory faucets shall be ~~2~~16 ounces. The maximum volume shall be ~~64~~48 ounces for hot or tempered water from a water heater or boiler; and 24 ounces for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section R403.5.4.2.1. Construction documents shall specify the pipe volume supplying each fixture and show the calculations used to determine pipe volume.

**R403.5.4.2.1 Water volume determination.** The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the “Volume” column of Table R403.5.4.1. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or a heat-traced pipe, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

**Table R403.5.4.1**   
**Pipe Volume and Maximum Piping Lengths**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Nominal Pipe or Tube Size (inch) | VOLUME (Liquid Ounces Per Foot Length) | Maximum Pipe or Tube Length | | |
| System without a circulation loop or heat-traced line (feet) | System with a circulation loop or heat-traced line (feet) | Lavatory faucets – public, metering and nonmetering (feet) |
| 1/4a | 0.33 | 50 | 16 | ~~6~~ 16 |
| 5/16a | 0.5 | 50 | 16 | ~~4~~ 16 |
| 3/8a | 0.75 | 50 | 16 | ~~3~~ 16 |
| 1/2 | 1.5 | 43 | 16 | ~~2~~ 16 |
| 5/8 | 2 | 32 | 12 | ~~1~~ 12 |
| 3/4 | 3 | 21 | 8 | ~~0.5~~ 8 |
| 7/8 | 4 | 16 | 6 | ~~0.5~~ 6 |
| 1 | 5 | 13 | 5 | ~~0.5~~ 5 |
| 1 1/4 | 8 | 8 | 3 | ~~0.5~~ 3 |
| 1 1/2 | 11 | 6 | 2 | ~~0.5~~ 2 |
| 2 or larger | 18 | 4 | 1 | ~~0.5~~ 1 |
| 1. The flow rate for ¼-inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16-inch size, it is limited to 1 gpm; for 3/8-inch size, it is limited to 1.5 gpm. | | | | |

**R403.5.4.3 Drain water heat recovery units.**  Projects shall include a drain water heat recovery unit in accordance with R403.5.3 that captures heat from at least one shower.

**R403.5.4.4 Recirculation systems.** Projects shall include a recirculation system with no more than 0.5-gallon (1.9 liter) storage in the individual branches served by the loop.  The storage limit shall be measured from the point where the branch feeding the fixture branches off the recirculation loop to the fixture. Recirculation systems must be based on an occupant-controlled switch, an occupancy sensor, or an adaptive learning pump control, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater. Construction documents shall show the recirculation system. At the time of inspection, the recirculation system shall be installed.

**R403.5.4.5 Plumbing fixtures.** Plumbing fixtures in residential spaces that are connected to the *service water-heating* system shall have a flow or consumption rating less than or equal to the values shown in Table R403.5.4.5.

**Table R403.5.4.5 Maximum Flow Rating for Residential Plumbing Fixtures with Heated Water**

|  |  |
| --- | --- |
| **Plumbing Fixture** | **Maximum Flow Rate**e |
| Faucet for private lavatory,a hand sinks, or bar sinks | 1.2 gpm at 60 psi (0.095 L/s at 410 kPa) |
| Faucet for residential kitchen sink a, b, c | 1.8 gpm at 60 psi (0.11 L/s at 410 kPa) |
| Shower head (including hand-held shower spray) a, b, d | 1.8 gpm at 80 psi (0.13 L/s at 550 kPa) |

1. Showerheads, lavatory faucets and kitchen faucets are subject to U.S. Federal requirements *listed* in 10 CFR 430.32(o)-(p).
2. Maximum flow allowed is less than required by flow rates *listed* in U.S. 10 CFR 430.32(o)-(p) for showerheads and kitchen faucets.
3. Residential kitchen faucet may temporarily increase the flow above the maximum rate, but not above 2.2 gallons per minute at 60 psi (0.14 L/s at 410 kPa) and must default to the maximum flow rate listed.
4. When a shower is served by multiple shower heads, the combined flow rate of all shower heads controlled by a single valve shall not exceed the maximum flow rate listed or the shower shall be designed to allow only one shower head to operate at a time.
5. Construction documents shall include documentation showing the maximum flow rate of the fixtures covered in this table. At the time of inspection, all fixtures covered in this table shall be installed.

## Addition of New Section R403.5.5 Demand Responsive Water Heating

Section R403.5 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R403.5.5 as follows:

**R403.5.5 Demand responsive water heating.** Electric storage water heaters with a rated water storage volume of 40 gallons (150L) to 120 gallons (450L) and a nameplate input rating equal to or less than 12kW shall be provided with *demand responsive controls* in accordance with Table R403.5.4 or another equivalent *approved* standard.

**Exceptions:**

1. Water heaters that are capable of delivering water at a temperature of 180°F (82°C) or greater.
2. Water heaters that comply with Section IV, Part HLW or Section X of the ASME Boiler and Pressure Vessel Code.
3. Water heaters that use 3-phase electric power.

**TABLE R403.5.4** ***DEMAND RESPONSIVE CONTROLS* FOR WATER HEATING**

|  |  |  |
| --- | --- | --- |
| Equipment Type | Manufactured Before 7/1/2025 | Manufactured On or After 7/1/2025 |
| Electric storage water heaters | ANSI/CTA-2045-B Level 1 and also capable of initiating water heating to meet the temperature set point in response to a *demand response signal*. | ANSI/CTA-2045-B Level 2, except “Price Stream Communication” functionality as defined in the standard. |

## Amendments to Section R403.6.1 Heat or Energy Recovery Ventilation

Section R403.6.1 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.6.1 Heat or energy recovery ventilation**. *Dwelling units* shall be provided with a heat recovery or energy recovery ventilation system ~~in Climate Zones 7 and 8~~ installed per manufacturer’s instructions. The system shall be sized to account for the *building’s conditioned floor area* and number of occupants. The system shall be balanced with minimum sensible heat recovery efficiency of ~~65~~ 70 percent at 32°F (0°C) at a flow greater than or equal to design airflow. Construction documents shall include documentation of the heat or energy recovery ventilation system recovery efficiency.

## Amendments to Section R403.6.3 Testing

Section R403.6.3 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.6.3 Testing.** Mechanical *ventilation* systems shall be tested and verified by an *approved* agency and measured using a flow hood, flow grid, or other airflow measuring device in accordance with Air Conditioning Contractors of America (ACCA) HVAC Quality Installation Verification Protocols – ANSI/ACCA 9QIvp-2016 or ANSI/RESNET/ICC Standard 380-2019 to provide the minimum *ventilation* flow rates required by Section R403.6. ~~Testing shall be performed according to the ventilation equipment manufacturer's instructions, or by using a flow hood or box, flow grid, or other airflow measuring device at the mechanical ventilation fan's inlet terminals or grilles, outlet terminals or grilles, or in the connected ventilation ducts.~~ ~~Where required by the code official, testing shall be conducted by an approved third party.~~ A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official.*

**Exception:** Kitchen range hoods that are ducted to the outside with 6-inch (152 mm) or larger duct and not more than one 90-degree (1.57 rad) elbow or equivalent in the duct run.

## Amendments to Section R403.8 Systems Serving Multiple Dwelling Units

Section R403.8 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R403.8 Systems serving multiple dwelling units.** Systems serving multiple *dwelling units* shall comply with Sections C403 and C404 of the International Energy Conservation Code – Commercial Provisions instead of Section R403. The control systems shall be tested and commissioned in accordance with Section C408.

## Addition of New Section R403.13 Clothes Drying

Section R403 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R403.13 as follows:

**R403.13 Fossil Fuel Clothes drying equipment.** Clothes drying equipment that use fossil fuels shall not be installed in new *buildings*.

## Amendments to Section R404.1 Fuel Gas Lighting

Section R404.1.1 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R404.1.1 Fuel gas lighting equipment.** Fuel gas lighting systems shall not ~~have continuously burning pilot lights~~ be installed.

## Addition of New Section R404.4 Electric Readiness

Section R404 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R404.4 as follows:

**R404.4 Electric readiness.** New *buildings* that use fossil fuels for space heating, water heating, or cooking shall comply with the requirements of Sections R404.4.1 through R404.4.4.

**Exception:** New *buildings* complying with Section C405.13.

**R404.4.1 Fossil fuel space heating.** Locations of fossil fuel warm-air furnaces or fossil fuel boilers shall be provided with an individual branch circuit in accordance with all of the following:

1. The branch circuit conductors shall terminate within 3 ft (1 m) of the location of the space heating equipment and shall be readily accessible.
2. The branch circuit conductors shall be sized to serve heat pump space heating equipment sized in accordance with the requirements of R403.7, and
3. The point of origin and the termination of the branch circuit shall be labeled “For future heat pump space heating equipment.”

**R404.4.2 Fossil fuel water heaters.** Locations of fossil fuel water heaters shall comply with all of the following:

1. An individual 30 ampere, 208/240-volt branch circuit shall be provided and terminate within 3 ft (1 m) of the water heater and shall be readily accessible.
2. The point of origin and the termination of the branch circuit shall be labeled "For future electric water heater".
3. The space containing the water heater shall have a height of not less than 7 ft (2 m), a width of not less than 3 ft (1 m), a depth of not less than 3ft (1 m) and a volume of not less than 700 ft3 (20 m3).

**Exception:**

Where the space containing the water heater is provided with air *ducts* or transfer openings to accommodate a heat pump water heater, the minimum volume shall not be required.

**R404.4.3 Cooking products.** Locations of fossil fuel ranges, cooktops and ovens shall be provided with an individual branch circuit in accordance with all of the following:

1. The branch circuit shall be rated for 208/240-volts and not less than 50 amps.
2. The branch circuit shall terminate within 3 ft (1 m) of the appliance and shall be readily accessible.
3. The point of origin and termination of the branch circuit shall be labeled “For future electric cooking appliance”.

**R404.4.4 Onsite Transformers.** Enclosed spaces and underground vaults containing onsite electric transformers on the building side of the electric utility meter shall have sufficient space to accommodate transformers sized to serve the additional electric loads identified in Sections R404.4.1 through R404.4.3.

## Addition of New Section R404.5 On-site Renewable Energy

Section R404 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R404.5 as follows:

**R404.5 On-site renewable energy.** The *building* shall comply with the requirements of R404.5.1 or R404.5.2.

**R404.5.1 One- and two- family dwellings and townhouses.** Install an *on-site renewable energy* system with a nameplate DC power rating measured under standard test conditions, of no less than 4 kW.

**Exceptions:**

1. A *building* with an *on-site renewable energy* system with a nameplate DC power rating measured under standard test conditions, of no less than 2 kW and an installed on-site *energy storage system* complying with Section R404.6.1.
2. A *building* with a permanently installed domestic solar water heating system with a minimum solar savings fraction of 0.5.
3. A *building* where the *potential solar zone area* is less than 300 square feet.

**404.5.2 Group R Occupancies.** *Buildings* in Group R-2, R-3 and R-4 shall install an *on-site renewable energy system* with a rated capacity of not less than 1.0 W/ft2 multiplied by the gross *conditioned floor area.*

**Exceptions:**

1. A *building* with an *on-site renewable energy system* with a rated capacity of not less than 0.5 W/ft2 multiplied by the gross *conditioned floor area* and an installed on-site *energy storage system* complying with Section R404.6.1.
2. A *building* with a permanently installed domestic solar water heating system with a minimum solar savings fraction of 0.5.
3. A *building* where the *potential solar zone area* is less than 300 square feet.

**R404.5.3 Renewable energy certificate documentation.** Documentation shall be provided to the *code official* that indicates that *renewable energy certificates* (RECs) associated with the *on-site renewable energy* will be retained and retired by or on behalf of the owner or tenant.

## Addition of New Section R404.6 Energy Storage Infrastructure

Section R404 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R404.6 as follows:

**R404.6 Electrical *energy storage system*.** One- and two-family dwellings, townhouse units, and Group R-3 occupancies shall either comply with R404.6.1 or R404.6.2. *Buildings* with Group R-2 and R-4 occupancies shall comply with C405.15.

**R404.6.1 Electrical energy storage energy capacity.** Each *building* shall have an *ESS* with a minimum rated energy capacity of 5 kWh with a minimum of four *ESS* supplied branch circuits.

**R404.6.2 Electrical energy storage system ready.** Each *building* shall be energy storage ready area in accordance with Sections R404.6.2.1 through R404.6.2.4.

**R404.6.2.1 Energy storage system space.** Interior or exterior space with dimensions and locations in accordance with Section R327 of the Residential Code of New York State and Section 110.26 of NFPA 70 shall be reserved to allow for the future installation of an energy storage system.

**R404.6.2.2 System isolation equipment space.** Space shall be reserved to allow for the future installation of a transfer switch within 3 feet (305 mm) of the main panelboard. Raceways shall be installed between the panelboard and the transfer switch location to allow the connection of an *ESS*.

**R404.6.2.3 Panelboard with backed-up load circuits.** A dedicated raceway from the main service to a panelboard that supplies the branch circuits served by the *ESS*. All branch circuits are permitted to be supplied by the main service panel prior to the installation of an *ESS.* The trade size of the raceway shall be not less than one inch. The panelboard that supplies the branch circuits shall be labeled "Subpanel reserved for future battery energy storage system to supply essential loads."

**R404.6.2.4 Branch circuits served by *ESS*.** A minimum of four branch circuits shall be identified and have their source of supply collocated at a single panelboard supplied by the *ESS*. The following end uses shall be served by the branch circuits:

1. A refrigerator.
2. One lighting circuit near the primary egress.
3. A sleeping room receptacle outlet.

## Addition of New Section R404.7 Electrical Vehicle Power Transfer Infrastructure

Section R404 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R404.7 as follows:

**R404.7 Electric Vehicle Power Transfer Infrastructure.** New *automobile parking spaces* for one- and two-family dwellings and townhouses shall be provided in accordance with this section. All other new *residential* parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Section C405.16.

**R404.7.1 Quantity.** Each *dwelling unit* with a designated attached or detached garage or other onsite private parking provided adjacent to the *dwelling unit* shall be provided with one *EV ready space*.

**R404.7.2 EV Ready Spaces.** Each branch circuit serving *EV ready spaces* used to comply with Section R404.7.1 shall comply with all of the following:

1. Terminate at an outlet or enclosure located within 3 feet (914 mm) of each *EV ready space* it serves.
2. Have a minimum circuit capacity of 9.6 kVA (or 40A at 240V).
3. The panelboard or other electrical distribution equipment directory shall designate the branch circuit as “For electric vehicle supply equipment (EVSE)” and the outlet or enclosure shall be marked “For electric vehicle supply equipment (EVSE).”
4. Where a circuit is shared or managed, it shall be in accordance with NFPA 70.

## Amendments to Section R405.2 Performance-Based Compliance

Section R405.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R405.2 Performance-based compliance.** Compliance based on total building performance requires that a *proposed design* meets all of the following:

1. The requirements of the sections indicated within Table R405.2.
2. The proposed total *building thermal envelope* UA, which is the sum of U-factor times assembly area, shall be less ~~greater~~ than or equal to the *building thermal envelope* UA using the prescriptive U-factors from Table R402.1.2 multiplied by 1.30 in accordance with Equation 4-1. Wall assembly U-factors shall include the thermal bridging impacts listed in C402.6.1 and calculated using Equation C402.6.2.~~levels of efficiency and solar heat gain coefficients in Table R402.1.1 or R402.1.3 of the 2009~~ *~~International Energy Conservation Code~~* The area-weighted maximum *fenestration* *SHGC* permitted shall be 0.40.

UAProposed design = 1.30 x UAPrescriptive reference design (Equation 4-1)

1. An annual ~~energy cost~~ site energy use expressed in Btu or Btu per square foot of *conditioned floor area* that is less than or equal to 80% of the annual ~~energy cost~~ site energy use expressed in Btu or Btu per square foot of *conditioned floor area* of the *standard reference design* for the 2021 IECC. ~~Energy prices shall be taken from a source approved by the code official, such as the Department of Energy, Energy Information Administration's State Energy Data System Prices and Expenditures reports. Code officials shall be permitted to require time-of-use pricing in energy cost calculations.~~

**~~Exception:~~** ~~The energy use based on source energy expressed in Btu or Btu per square foot of~~ *~~conditioned floor area~~* ~~shall be permitted to be substituted for the energy cost. The source energy multiplier for electricity shall be 3.16. The source energy multiplier for fuels other than electricity shall be 1.1.~~

Table R405.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**TABLE R405.2 REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE**

|  |  |
| --- | --- |
| **SECTION** | **TITLE** |
| **General** | |
| ~~R401.2.5~~ | ~~Additional energy efficiency~~ |
| R401.3 | Certificate |
| **Building Thermal Envelope** | |
| R402.1.1 | Vapor retarder |
| R402.2.3 | Eave baffle |
| R402.2.4.1 | Access hatches and doors |
| R402.2.10.1 | Crawl space wall insulation installation |
| R402.4.1.1 | Installation |
| R402.4.1.2 | Testing |
| R402.4.2 | Fireplaces |
| R402.5 | Maximum fenestration U-factor and SHGC |
| R402.6 | Thermal bridge mitigation |
| **Mechanical** | |
| R403.1 | Controls |
| R403.3, including R03.3.1, except Sections R403.3.2, R403.3.3, and R403.6 | Ducts |
| R403.4 | Mechanical system piping insulation |
| R403.5.1 | Heated water circulation and temperature maintenance systems |
| R403.5.3 | Drain water heat recovery units |
| R403.5.5 | Demand responsive water heating |
| R403.6 | Mechanical ventilation |
| R403.6.1 | Heat or energy recovery |
| R403.6.3 | Testing |
| R403.7 | Equipment sizing and efficiency rating |
| R403.8 | Systems serving multiple dwelling units |
| R403.9 | Snow melt and ice systems |
| R403.10 | Energy consumption of pools and spas |
| R403.11 | Portable spas |
| R403.12 | Residential pools and permanent residential spas |
| R403.13 | Clothes drying |
| **Electrical Power and Lighting Systems** | |
| R404.1 | Lighting equipment |
| R404.2 | Interior lighting controls |
| R404.4 | Electric readiness |
| R404.5 | Onsite renewable energy |
| R404.6 | Electrical energy storage system |
| R404.7 | Electric vehicle power transfer infrastructure |

## Amendments to Section R406 Energy Rating Index Compliance Alternative

Table R406.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**TABLE R406.2 REQUIREMENTS FOR ENERGY RATING INDEX**

|  |  |
| --- | --- |
| **SECTION** | **TITLE** |
| **General** | |
| ~~R401.2.5~~ | ~~Additional energy efficiency~~ |
| R401.3 | Certificate |
| **Building Thermal Envelope** | |
| R402.1.1 | Vapor retarder |
| R402.2.3 | Eave baffle |
| R402.2.4.1 | Access hatches and doors |
| R402.2.10.1 | Crawl space wall insulation installation |
| R402.4.1.1 | Installation |
| R402.4.1.2 | Testing |
| R402.4.2 | Fireplaces |
| R402.6 | Thermal bridge mitigation |
| **Mechanical** | |
| R403.1 | Controls |
| R403.3, including R03.3.1, except Sections R403.3.2, R403.3.3, and R403.6 | Ducts |
| R403.4 | Mechanical system piping insulation |
| R403.5.1 | Heated water circulation and temperature maintenance systems |
| R403.5.3 | Drain water heat recovery units |
| R403.5.5 | Demand responsive water heating |
| R403.6 | Mechanical ventilation |
| R403.6.1 | Heat or energy recovery |
| R403.6.3 | Testing |
| R403.7 | Equipment sizing and efficiency rating |
| R403.8 | Systems serving multiple dwelling units |
| R403.9 | Snow melt and ice systems |
| R403.10 | Energy consumption of pools and spas |
| R403.11 | Portable spas |
| R403.12 | Residential pools and permanent residential spas |
| R403.13 | Clothes drying |
| **Electrical Power and Lighting Systems** | |
| R404.1 | Lighting equipment |
| R404.2 | Interior lighting controls |
| R404.4 | Electric readiness |
| R404.5 | Onsite renewable energy |
| R404.6 | Electrical energy storage system |
| R404.7 | Electric vehicle power transfer infrastructure |
| R406.3 | Building thermal envelope |

**~~R406.3 Building thermal envelope.~~** ~~Building and portions thereof shall comply with Section R406.3.1 or R406.3.2.~~

**R406.3~~.1 On-site renewables are not included~~Building thermal envelope.** ~~Where on-site renewable energy is not included for compliance using the ERI analysis of Section R406.4, t~~The proposed total *building thermal envelope* UA, which is sum of U-factor times assembly area, shall be less than or equal to the *building thermal envelope* UA using the prescriptive U-factors from Table R402.1.2 multiplied by 1.15 in accordance with Equation 4-1. The area-weighted maximum *fenestration SHGC* permitted in Climate Zones 0 through 3 shall be 0.30. Wall assembly U-factors shall include the thermal bridging impacts listed in C402.6.1 and calculated using Equation C402.6.2.

UAProposed design ≤ 1.30 x UAPrescriptive reference design

(Equation 4-2)

**~~R406.3.2 On-site renewables are included.~~** ~~Where on-site renewable energy is included for compliance using the ERI analysis of Section R406.4, the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table R402.1.2 or Table R402.1.4 of the 2018 International Energy Conservation Code.~~

**R406.4 Energy Rating Index.** The Energy Rating Index (ERI) shall be determined in accordance with ANSI/RESNET/ICC 301. ~~except for buildings covered by the International Residential Code , the ERI reference design ventilation rate shall be in accordance with Equation 4-2.~~

~~Ventilation rate, CFM = (0.01 x total square foot area of house) + [7.5 x (number of bedrooms + 1)]~~

**~~(Equation 4-2)~~**

Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the *building site* shall not be included in the ERI reference design or the rated design. ~~For compliance purposes, any reduction in energy use of the rated design associated with on-site renewable energy shall not exceed 5 percent of the total energy use.~~

**R406.5 ERI-based compliance.** Compliance based on an ERI analysis requires that the rated proposed design and confirmed built dwelling be shown to have an ERI less than or equal to the appropriate value indicated in Table R406.5 when compared to the ERI reference design.

**TABLE R406.5 MAXIMUM ENERGY RATING INDEX**

*Reserved*

## Amendments to Section R408 Additional Efficiency Credits

Section R408 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**SECTION R408**

**ADDITIONAL EFFICIENCY CREDITS ~~PACKAGE~~**

**R408.1 Scope.** This section establishes additional efficiency credits ~~package~~ to achieve additional energy efficiency in accordance with R401.2.1.

**R408.2 Additional efficiency credits ~~package~~.** Each *residential building* shall achieve the following minimum number of credits from Table R408.2:

1. Small detached one-family dwellings and detached two-family dwellings (*dwelling units* less than 1,800 square feet in *conditioned floor area*): 12 credits from Table R408.2.
2. All other detached one-family dwellings and detached two-family dwellings (*dwelling units* exceeding 1,800 square feet in *conditioned floor area*): 15 credits from Table R408.2.
3. All other *residential buildings*: 12 credits from Table R408.2.

**Exception:** A *building* that meets the requirements of Section R409.

~~Additional efficiency package options for compliance with Section R401.2.1 are set forth in Sections R408.2.1 through R408.2.5.~~

**~~R408.2.1 Enhanced envelope performance option.~~** ~~The total building thermal envelope UA, the sum of U-factor times assembly area, shall be less than or equal to 95 percent of the total UA resulting from multiplying the U-factors in Table R402.1.4 by the same assembly area as in the proposed building. The UA calculation shall be performed in accordance with Section R402.1.5. The area-weighted average SHGC of all glazed fenestration shall be less than or equal to 95 percent of the maximum glazed fenestration SHGC in Table R402.1.2.~~

**~~R408.2.2 More efficient HVAC equipment performance option.~~** ~~Heating and cooling equipment shall meet or exceed one of the following efficiencies:~~

~~1. Greater than or equal to 95 AFUE natural gas furnace and 16 SEER air conditioner.~~

~~2. Greater than or equal to 10 HSPF / 16 SEER air source heat pump.~~

~~3. greater than or equal to 3.5 COP ground source heat pump.~~

~~For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the cooling design load. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in this section and shall be sized to serve 100 percent of the heating design load.~~

**~~R408.2.3 Reduced energy use in service water heating option~~**~~. The hot water system shall meet or exceed one of the following efficiencies:~~

~~1. Greater than or equal to 82 EF fossil fuel service water heating system.~~

~~2. Greater than or equal to 2.0 EF electric service water heating system.~~

~~3. Greater than or equal to 0.4 Solar Fraction solar water heating system.~~

**~~R408.2.4 More efficient duct thermal distribution system option.~~** ~~The thermal distribution system shall meet or exceed one of the following efficiencies:~~

~~1. 100 percent of ducts and air handlers located entirely within the building thermal envelope.~~

~~2. 100 percent of ductless thermal distribution system or hydronic thermal distribution system~~  ~~located completely inside the building thermal envelope.~~

~~3. 100 percent of duct thermal distribution system located in conditioned space as defined by~~  ~~Section R403.3.2.~~

**~~R408.2.5 Improved air sealing and efficient ventilation system option.~~** ~~The measured air leakage rate shall be less than or equal to 3.0 ACH50, with either an Energy Recovery Ventilator (ERV) or Heat Recovery Ventilator (HRV) installed. Minimum HRV and ERV requirements, measured at the lowest tested net supply airflow, shall be greater than or equal to 75 percent Sensible Recovery Efficiency (SRE), less than or equal to 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the ERV shall be greater than or equal to 50 percent Latent Recovery/Moisture Transfer (LRMT).~~

**TABLE R408.2 ADDITIONAL EFFICIENCY CREDITS**

|  |  |  |
| --- | --- | --- |
| **Credit Option** | | **Credits** |
| 1. **Envelope**   Only one option from 1.1 through 1.2 may be selected in this category. Compliance with total UA targets is demonstrated using Section R402.1.5, Total UA alternative. | |  |
| 1.1 | Comply with Table R402.1.3 with the following modifications:   1. Vertical *fenestration* U-factor: 0.18 2. Ceiling *R*-value: 66 3. Wood frame wall *R*-value: 30+9ci or 20+15ci 4. Mass wall *R*-value: 25 5. Floor *R*-value: 38 6. Basement wall *R*-value: 20+9ci or 21ci 7. Slab *R*-value: 15 perimeter and under entire slab 8. Crawl space wall *R*-value: 20+9ci or 21ci   **or**  Reduce total UA from level calculated in R402.1.5 by 15% | 4 |
| 1.2 | Comply with Table R402.1.3 with the following modifications:   1. Vertical *fenestration* U-factor: 0.16 2. Ceiling *R*-value: 70 3. Wood frame wall *R*-value: 35+15ci or 25+20ci 4. Mass wall *R*-value: 28 5. Floor *R*-value: 38 6. Basement wall *R*-value: 25+15ci or 15+20ci 7. Slab *R*-value: 20 perimeter and under entire slab 8. Crawl space wall *R*-value: 25+15ci or 15+20ci   **or**  Reduce total UA from level calculated in R402.1.5 by 25% | 6 |
| 1. **Air tightness**   Only one option from 2.1 through 2.2 may be selected in this category.  To qualify to claim this credit, the construction documents shall specify the option being selected and shall specify the maximum allowable air leakage rate. Testing shall be conducted in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827. | |  |
| 2.1 | Reduce the tested air leakage to 1.5 air changes per hour maximum at 50 Pascals when testing in accordance with Section R402.4.1.2.  Attached single-family and multiple-family building *dwelling units* and *dwelling units* under 1,500 square feet may also reduce the tested air leakage to 0.08 cfm/ft2 of *dwelling unit enclosure area* maximum at 50 Pascals as an alternative. | 6 |
| 2.2 | Reduce the tested air leakage to 0.6 air changes per hour maximum at 50 Pascals when testing in accordance with Section R402.4.1.2.  Attached single-family and multiple-family building *dwelling units* and *dwelling units* under 1,500 square feet may also reduce the tested air leakage to 0.03 cfm/ft2 of *dwelling unit enclosure area* maximum at 50 Pascals as an alternative. | 9 |
| 1. **Heat or energy recovery ventilation efficiency**   To qualify to claim this credit, the construction documents shall specify the option being selected and shall show the heat or energy recovery ventilation system and recovery efficiency. | |  |
| 3.1 | All whole house v*entilation* requirements shall be met with a heat or energy recovery ventilation system with minimum sensible heat recovery efficiency of 0.80 | 1 |
| 1. **Thermal distribution system**   To qualify to claim this credit, the construction documents shall specify the option being selected and shall show the air-side and water-side heating and cooling distribution system of the HVAC system. | |  |
| 4.1 | The thermal distribution system is ductless or hydronic. | 1 |
| 1. **HVAC equipment**   Only one option from 5.1 through 5.3 may be selected in this category.  To qualify to claim this credit, the construction documents shall specify the option being selected and shall specify the heating equipment type and the minimum equipment efficiency. Where multiple individual heating or cooling systems serve the project, the total equipment efficiency shall be the weighted average efficiency based on individual system capacity. | |  |
| 5.1 | Heating and cooling are met with air-source heat pump with minimum HSPF of 10.0 if ductless and 9.0 if ducted and minimum SEER of 15. In Climate Zones 5A and 6A, air-source heat pumps shall meet the following requirements for cold climate heat pumps:   * COP at 5° F ≥ 1.75 * Percent of heating capacity at 5° F ≥ 70% of that at 47° F | 7 |
| 5.2 | Heating and cooling are met with air-source heat pump with minimum HSPF of 12.0 if ductless and 11.0 if ducted and minimum SEER of 20. In Climate Zones 5A and 6A, air-source heat pumps shall meet the following requirements for cold climate heat pumps:   * COP at 5° F ≥ 1.75 * Percent of heating capacity at 5° F ≥ 70% of that at 47° F | 9 |
| 5.3 | Heating and cooling are met with ground-source heat pump with minimum COP of 3.5. | 9 |
| 1. **Appliances**   To qualify to claim these credits, the construction documents shall specify the option being selected and shall show the appliance type and provide documentation of Energy Star compliance. At the time of inspection, all appliances shall be installed and connected to utilities. Dryer *ducts* and exterior dryer vent caps are not permitted to be installed in the *dwelling unit*. | |  |
| 6.1 | All of the following appliances shall be new and permanently connected to the building energy supply system and shall meet the following standards:    Dishwasher – Energy Star rated  Refrigerator – Energy Star rated  Washing machine – Energy Star rated  Clothes dryer – Energy Star rated, ventless dryer with a minimum CEF rating of 5.2. | 5 |

## Addition of New Section R409 Passive House

**R409.1 General.** Projects shall comply with Section R409.1.1 or R409.1.2

**R409.1.1 Passive House Institute U.S. (PHIUS).** Projects shall comply with PHIUS 2021 Passive Building Standard. and using performance calculations by PHIUS-approved software.

**R409.1.1.1 PHIUS documentation.** Prior to the issuance of a building permit, the following items must be provided to the *code official*:

1. A list of compliance features
2. A PHIUS precertification letter.

Prior to the issuance of a certificate of occupancy, a PHIUS 2021 project certificate must be provided to the *code official*.

**R409.1.2 Passive House Institute (PHI).** Projects shall comply with Low Energy Building Standard, version 9f or later, including performance calculations by PHI-approved software.

**R409.1.2.1 PHI documentation.** Prior to the issuance of a building permit, the following items must be provided to the *code official*:

1. A list of compliance features.
2. A statement from a passive house certifier that the modeled energy performance is congruent with the plans and specifications, and that the modeled performance meets the minimum requirements of the standard.

Prior to the issuance of a certificate of occupancy, a PHI Low Energy Building project certificate must be provided to the *code official*.

## Amendments to Section R502.3.2 Heating and Cooling Systems

Section R502.3.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R502.3.2 Heating and cooling systems.** HVAC *ducts* newly installed as part of an addition shall comply with Section R403.

**Exception:** Where *ducts* from an existing heating and cooling system are extended to an addition, Sections R403.3.5 and R403.3.6 shall not be required.

## Amendments to Section R503.1.2 Heating and Cooling Systems

Section R503.1.2 of the 2021 IECC Residential Provisions shall be amended to read as follows:

**R503.1.2 Heating and cooling systems.** New heating, cooling and *duct systems* ~~HVAC ducts~~ newly installed as part of an alteration shall comply with Section R403. Alterations to heating, cooling and *duct systems* shall comply with this section.

**Exception:** Where *ducts* from an existing heating and cooling system are extended to an addition.

**R503.1.2.1 System Sizing** New heating and cooling equipment that is part of an *alteration* shall be sized in accordance with Section R403.7 based on the existing *building* features as modified by the *alteration.*

**Exception:** Where it has been demonstrated to the *code official* that compliance with this section would result in heating or cooling equipment that is incompatible with the remaining portions of the existing heating or cooling system.

**R503.1.2.2 Ducts.** HVAC *ducts* newly installed as part of an alteration shall comply with Section R403.

**Exception:** Where *ducts* from an existing heating and cooling system are extended to an addition.

**R503.1.2.3 Duct Leakage.** Where an *alteration* includesany of the following, *ducts* shall be tested in accordance with Section R403.3.5 and shall have a total leakage less than or equal to 12.0 cubic feet per minute (339.9 L/min) per 100 square feet (9.29 m2) of *conditioned floor area*:

1. Where 25% or more of the registers that are part of the *duct* system are relocated*.*
2. Where 25% or more of the total length of the *ducts* in the system are relocated.
3. Where the total length of all *ducts* in the system is increased by 25% or more.

**Exception:** *Duct* systems located entirely inside a *conditioned space* in accordance with R403.3.2.

## Addition of New Section R503.1.2.1 Controls

Section R503.1.2 of the 2021 IECC Residential Provisions shall be amended by the addition of a new section R503.1.2.1 as follows:

**R503.1.2.1 Controls.** New heating and cooling equipment that are part of the *alteration* shall be provided with controls that comply with Section R403.1 and R403.2.

## Amendments to Chapter 6 [RE] Referenced Standards

Chapter 6 [RE] of the 2021 IECC Residential Provisions shall be amended as follows:

**ACCA**

ANSI/ACCA 1 Manual D - 16 Residential Duct Systems

R403.3

ANSI/ACCA 9 QIvp - 16 Residential HVAC Quality Installation Verification Protocols

R403.6.3

**AHRI**

Air-Conditioning, Heating, & Refrigeration Institute

2111 Wilson Blvd, Suite 500

Arlington, VA 22201

AHRI 1380-2019 Demand Response through Variable Capacity HVAC Systems in Residential and Small Commercial Applications

R403.1.1

**ASME**

American Society of Mechanical Engineers

Two Park Avenue

New York, NY 10016-5990

BPVC Boiler and Pressure Vessel Code

R403.5.5

**CTA**

Consumer Technology Association Technology & Standards Department

1919 S Eads Street

Arlington , VA 22202

ANSI/CTA 2045-B February 2021 Modular Communications Interface for Energy Management

R403.5.5

**IEC**

IEC Regional Centre for North America

446 Main Street 16th Floor

Worcester MA 01608

IEC 62746-10-1 – 2018 Systems interface between customer energy management system and the power management system - Part 10-1: Open automated demand response

R403.1.1

**OpenADR**

OpenADR Alliance

111 Deerwood Road, Suite 200

San Ramon CA 94583

OpenADR 2.0a and 2.0b – 2019 Profile Specification Distributed Energy Resources

R403.1.1

**PHI**

Passive House Institute

Rheistrasse 44/46

64283 Darmstadt, Germany

PHI 2016 Passive House Building Standard, Version 9f

R408.2

**PHIUS**

PHIUS

53 W. Jackson, Ste. 1462

Chicago, IL 606~~5~~04, USA

PHIUS 2021 Passive Building Standard

R408.2

**UL**

UL 2202-2009 Electric Vehicle (EV) Charging System - with revisions through February 2018

R404.7

UL 2594-2016 Standard for Electric Vehicle Supply Equipment

R404.7