C407 Flex Points Additional Energy Efficiency

IECC: R401.2, R401.2.1 (New), R407 (New), R4071. (New), R407.2 (New), TABLE R407.2 (New)

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2018 International Energy Conservation Code

Revise as follows:

R401.2 Compliance. Projects shall comply with Section R401.2.1 one of the following:

1. Sections R401 through R404.
2. Section R405 and the provisions of Sections R401 through R404 indicated as "Mandatory."
3. The energy rating index (ERI) approach in Section R406.

Add new text as follows:

R401.2.1 Additional Energy Efficiency (Mandatory) 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 or more additional energy efficiency measure(s) shall be installed in accordance with Section R407.2 that cumulatively equal or exceed 10 (ten) Flex Points.
2. For buildings complying under the simulated performance alternative in Section R405, the building shall meet one of the following: (a) one or more additional energy efficiency measure(s) in Section R407.2 shall be installed that cumulatively equal or exceed ten Flex Points, without including such measures in the proposed design under Section R405; or (b) the proposed design of the building under section R405.2 shall have an annual energy cost that is less than or equal to 90% of the annual energy cost of the *standard reference design*.
3. For buildings that comply under the energy rating index alternative in Section R406, the energy rating index value shall be at least 10% less than the energy rating index target specified in Table R406.4.

R407
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

R4071. Scope This section establishes flex point alternatives to achieve additional energy efficiency in accordance with Section R401.2.1.

R407.2 Flex points for additional energy efficiency Measures shall be selected from Table R407.2.1. Each measure chosen shall receive credit for the Flex Points as indicated in the Table for the specific Climate Zone. Interpolation of points between measures shall not be permitted.

TABLE R407.2
FLEX POINTS FOR ADDITIONAL ENERGY EFFICIENCY

Measure Number	Measure Description	Flex Point Value								
		CZ 1	CZ 2	CZ 3	CZ 4	CZ 4C [a]	CZ 5	CZ 6	CZ 7	CZ 8
1a	≥ 2.5% reduction in total UA [b]	1	1	2	2	2	2	3	4	4
1b	≥ 5% reduction in total UA [b]	3	3	3	3	3	4	5	5	5
1c	≥ 7.5% reduction in total UA [b]	5	5	5	5	5	6	7	8	8
2a	≥ 10% reduction in glazed vertical fenestration area-weighted average SHGC	2	1	-	-	-	-	-	-	-
2b	≥ 20% reduction in glazed vertical fenestration area-weighted average SHGC	4	1	-	-	-	-	-	-	-
_	_	_	_	_	_	_	_	_	_	_
3a	≤ 3 ACH50 air leakage rate with ERV or HRV installed [c]	2	4	5	7	7	7	7	8	8
3b	≤ 2 ACH50 air leakage rate with ERV or HRV installed [c]	2	5	7	9	9	9	10	11	11
_	_	_	_	_	_	_	_	_	_	_
4a	≤ 2 CFM of total duct leakage per 100 square feet of conditioned floor area when tested in accordance with Section R403.3	1	1	1	1	-	1	1	1	1
4c	100% of ductless thermal distribution system or hydronic thermal distribution system located completely inside the *building thermal envelope* or 100% of duct thermal distribution system located in *conditioned space* [d]	8	8	9	11	8	12	15	17	17
5a	≥ 18 SEER and ≥ 14 EER cooling system efficiency [e]	9	7	3	2	-	-	-	-	-
5b	≥ 16 EER cooling system efficiency [e]	10	7	3	2	-	-	-	-	-
6a	≥ 96 AFUE heating system efficiency [f]	-	2	6	9	10	10	11	12	14
7a	≥ 10.5 HSPF heating system efficiency [f]	-	1	2	4	4	5	4	3	3
7b	≥ 3.5 COP heating system efficiency [f]	-	2	4	6	6	8	7	6	5
_	_	_	_	_	_	_	_	_	_	_
8a	≥ 0.8 EF for fossil fuel service water heating system	7	5	4	3	2	2	2	1	1
8b	≥ 1.15 EF for electric service water heating system	7	7	7	4	5	3	3	2	2
8c	≥ 0.4 Solar Fraction for service water heating system	8	9	9	7	9	6	5	4	3

a. Climate Zone 4C is Climate Zone Marine 4.

b. The Total UA shall be calculated in accordance with Section R402.1.5 Total UA alternative.

c. Minimum Heat Recovery Ventilator (HRV) and Energy Recovery Ventilator (ERV) requirements, measured at the lowest tested net supply airflow, shall be ≥ 75% Sensible Recovery Efficiency (SRE), ≤ 1.1 W/CFM Fan Energy and shall not use recirculation as a defrost strategy. In addition, the Energy Recovery Ventilator (ERV) shall be ≥ 50% Latent Recovery/Moisture Transfer (LRMT).

d. As defined by Section R403.3.7.

e. For multiple cooling systems, all systems shall meet or exceed the minimum efficiency requirements in Table R407.2.1 and shall be sized to serve 100% of the cooling design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the cooling design load served by the system.

f. For multiple heating systems, all systems shall meet or exceed the minimum efficiency requirements in Table R407.2.1 and shall be sized to serve 100% of the heating design load. As an alternative, each system installed shall receive credit for the percentage of the Flex Points for the measure equal to the percentage of the heating design load served by the system.

Reason Statement: This proposal, submitted by the Northwest Energy Codes Group, provides an alternative to the Flex Point proposal submitted by the Energy Efficient Codes Coalition by requiring ten flex points for an efficency increase of ten (10) percent over the base prescriptive codes. The Northwest pioneered the use of the prescriptive residential options that are currently in place in Washington, and formally were used in Oregon, and found them to be an effective method of increasing efficiency for residential construction using the prescriptive approach. This option does not require

performance energy modeling or HERS verification which will increase it usefulness. This type of points based option can also be easily implemented in the U.S. DOE REScheck software. This approach is also similar in structure to the Points Option code change proposal that has been submitted by the Northwest Energy Codes Group to C407 in the commercial provisions of the 2018 IECC. This proposal will provide more consistency between the IECC and the Washington State Residential Energy Code which is based on the IECC.
The purpose of this code change proposal is to improve overall residential building efficiency (heating, cooling and water heating energy) by roughly 10% and to create a scalable, flexible means of improving residential building efficiency for future IECC updates. Instead of requiring efficiency improvements to specific building components, the new "Flex Points" approach in Section R407 provides a multitude of options for builders to achieve the efficiency requirements of the IECC. This approach is also scalable according to a jurisdiction's needs – states or localities who need additional energy savings to meet energy or climate policy goals can adjust the number of required points accordingly. Package- or points-based approaches have been used for several years in Washington and Oregon.

This proposal is similar to the Flex Points proposal for the 2018 IECC in overall structure, but the points table has been simplified and updated based on feedback received in the previous Code Development Cycle. Like the previous version, this proposal also includes alternative compliance pathways for builders who select the simulated performance alternative or the Energy Rating Index, and will bring roughly equivalent improvements to all three compliance paths.

This Flex Points proposal is cost-effective, since it includes a number of options to achieve 10 points that are cost-effective.

The Flex Points proposal will provide three distinct benefits for jurisdictions adopting the 2021 IECC:

1. <u>This proposal meets a clear need for efficiency improvements in the model energy code now and in the future</u>.

Although the IECC has made small efficiency gains in the 2015 and 2018 editions, major gains have plateaued. Buildings still consume an estimated 42% of the nation's energy, 54% of its natural gas, and 71% of its electricity. Governors, legislators, and mayors are increasingly turning to building energy codes to meet energy and climate goals, and those codes should continue to provide reasonable improvements going forward. The U.S. Conference of Mayors, in its fourth consecutive resolution on the subject, reiterated their "concerted support for putting future triennial IECC updates on a "glide path" of steady efficiency gains that will improve the efficiency performance of millions of U.S. residential, multi-family, and commercial buildings." *See* 2018 U.S.C.M. Resolution 86 (June 11, 2018).

Several jurisdictions have already created or are in the process of creating package-based compliance paths or improved code provisions to meet their policy needs. The result is improved efficiency, but a lack of consistency in both format and requirements. Incorporating Flex Points into the 2021 IECC will not only provide a 10% boost in energy conservation but will also provide a realistic map for additional improvements going forward. And, by providing more uniform targets for the efficiency of building components, this proposal will contribute to economies of scale, potentially lowering prices for builders and ultimately consumers.

2. <u>This proposal will provide maximum flexibility for builders to achieve improved efficiency</u>.

Flex Points trusts that builders and design professionals will select the most cost-effective and sensible efficiency improvements for a given project. There are several alternatives for compliance in each climate zone, along with options to comply in a performance- or rating-based path. There are alternatives related to more insulation, more efficient windows, reduced air and duct leakage and improved equipment. We believe that this approach provides the right incentives for builders to make long-lasting improvements in residential buildings that are in the best interests of homeowners.

The point values have been calculated based on the present value of energy cost savings over the current code (including relevant federal equipment efficiency standards) and reflect the estimated useful life of each measure over an assumed 30-year life of the building. While a 30-year period is consistent with the typical life of a mortgage, it is a very conservative period given the likelihood that some measures will provide efficiency benefits for decades beyond the initial 30-year period.

The analysis behind the flex points is based on the methodology and assumptions included in the U.S. Department of Energy's Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes, including the economic equations to obtain the present value of energy costs within the calculation methodology. The energy consumption calculations take into consideration heating, cooling, and water heating energy, using DOE-2 energy simulation across 105 TMY3 weather locations and 12 building types to account for varying stories, foundations, and fuel types for each of the baseline and upgrade measures. The analysis compares the annual energy savings between a home with and without an

efficiency measure over the useful life of the efficiency measure using useful life data from NAHB and other sources. Energy costs were calculated using the most recent national EIA projections for natural gas and electricity. Because the analysis uses readily-available and widely-accepted tools and methodologies, we expect that future additions or changes will be straightforward.

3. This proposal will encourage efficiency improvements in building components that are currently difficult to regulate.

Flex Points addresses two issues that have complicated model energy codes for many years. First, innovative building practices or emerging technologies can benefit from being listed in codes, but states (and national code developing organizations) are reluctant to require new technologies or practices before they are market-tested. As a result, there are high barriers to entry for new technologies, even when they could transform the marketplace and provide energy- or cost-saving benefits for homeowners. As an example, Heat Recovery Ventilators (HRVs) are cost-effective and reasonable for much of the country, but individual circumstances or climate conditions may favor another approach. Rather than require HRVs in every case, or most cases with exceptions, HRVs and Energy Recovery Ventilators are included as one of several options available to builders in every climate zone. Not only will Flex Points create an opportunity for good technology to be used in more buildings, but it will open the door for market forces to make these technologies more widely available (and presumably less expensive to consumers). As new technologies or practices become available, these advances can be quickly and easily added into the Flex Points table, fast-tracking technology that is good for consumers.

Second, much of the heating, cooling, and water heating equipment installed in residential buildings is subject to federal preemption under the National Appliance Energy Conservation Act. As has been debated at length in ICC Code Development hearings over the last 15 years, including equipment efficiencies in performance trade-offs tends to weaken the efficiency of the energy code, since federal minimum efficiencies for nearly every covered product is well below the efficiency levels of commonly installed products. When these efficiency levels are used in trade-off baselines, builders use the improved efficiency of common heating, cooling, and water heating products as a means of trading away efficiency of more permanent building components and features, even though the equipment would have been installed anyway. This “free ridership” may provide short-term cost savings for homebuilders, but it saddles homeowners with unexpected high energy costs over the entire useful life of the building. Moreover, this equipment often carries a much shorter useful life, which is not typically captured in code compliance simulations.

Flex Points creates a new incentive to improve the efficiency of covered products without resulting in efficiency rollbacks elsewhere in the code. Heating, cooling, and water heating improvements (among others) are included among the Flex Points options with points calculated according to climate-specific energy cost savings and the longevity of the equipment. As compared to the previous Flex Points proposal, the list of options has been simplified and refocused on the equipment most likely to provide meaningful energy savings. Each of these upgrades will build upon the current IECC efficiency, rather than trading it away.

In sum, we believe that this proposal will improve efficiency by roughly 10% while unlocking the competitive market for new technologies or building components that are difficult to regulate and will provide a useful new tool for policymakers across the country – all without rolling back the effectiveness or efficiency of the IECC.

Bibliography: *Uniting Cities to Accelerate Focus on the Economic and Climate Benefits of Boosting America’s Building Energy Efficiency*, 2019 U.S.C.M. Resolution 86 (June 11, 2018), *available at* https://www.usmayors.org/the-conference/resolutions/?category=c9211&meeting=86th%20Annual%20Meeting.

Cost Impact: The code change proposal will increase the cost of construction
The code change proposal will increase the cost of construction. Requiring additional efficiency measures, such as more insulation, more efficient windows, reduced air leakage and duct leakage, and/or more efficient equipment, to save 10% energy will increase the cost of construction, but the resulting energy and cost savings will recoup the initial costs and will continue to benefit consumers over the useful life of the home.