Public Comments and NYSERDA Responses in Final Draft: NYStretch-Energy 2018

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Document Title		
NYStretch Code - Energy 2018 **August, 2018**		
Revision Date	**Description of Changes**	**Revision on Page(s)**
August, 2018	Original Issue	Original issue
August 29, 2018	Revised Section R403.5.4: Drain water heat recovery units	Page 56

NYStretch-2018 Comment and Alteration Process

Introduction

This document covers the constructive public comments received during the public comment period for the draft of NYStretch-2018 and summarizes the actions taken by the code development team that will appear in the final draft of the Stretch Code. The document is organized chronologically by the Sections of Stretch Code and includes information on individuals who commented on that Section of the Code, a compilation of comments received and a summary of actions that appear in the final draft of NYStretch-Energy 2018.

Part 1: Amendments to 2018 Energy Conservation Construction Code Commercial Provisions

NYStretch-2018 Code Section: Table C402.1.3 Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method

Reference ID # for Comments received on Table C402.1.3:

826b6f58
b75e513b
e570c543
e5802f1b
e879aefa
d163b05b
d19b1034
d2d0abb4
d2f9247a
d2f9826e
d2f990b7
d32357d9
d3253c78
d32699d0

Comment Text Received on Table C402.1.3:

- Regarding the proposed Amendments to Table C402.1.3 Opaque Thermal Envelope Insulation Component Minimum Requirements, R-Value Method) and to the proposed Amendments to Table C402.1.4 Opaque Thermal Envelope Assembly Maximum Requirements, U-Factor Method
    - We recommend this provision not be accepted I recommend a more gradual increase in R-Values and decreases in U-Value over the next decade. Recommending instead that the stretch code put a maximum of 10% higher R-value for Ci and 5% reduction in U-Factor (compared to the values in 2018 I-Code) in the pursuit of the Governor's objective to reduce energy consumption.
    - The stretch code proposed change is making the prescriptive compliance path #1 untenable and thus forcing one of the other compliance paths and pushing for full building energy modelling.

The provision proposed is not tenable for many high-rise construction with 'metal framed' walls with reasonable window to wall ratios. For example, the proposed change dramatically increasing the thermal requirements following the prescriptive code method #1 by doubling the R-value of continuous insulation or reducing maximum U-Values by almost 20%. For 'Metal Framed' walls in 'Marine 4' climate zone (that is NYC), the chart has drastically doubled the continuous insulation requirements from R- 13+7.5ci (in the 2018 IECC) to R13+15.6ci proposed in the stretch code. The equivalent requirement for U-Factor method reduces the max U-Factor from U-0.064 to 0.052.

  - This proposed push for better performance values within these 2 charts is not based in reality of buildable details using appropriate and safe products for such buildings. Of paramount concern is the adding of larger amounts of hazardous plastic insulation products within framed wall assemblies. Where design professionals have traditionally used non-combustible insulation products in such wall types (such as mineral wool insulation in 2-3" thicknesses to achieve R8.4-R12.6 ci), pushing the R-Value to 15.6ci will force the designer to infuse in buildings flammable plastic insulation products (such as spray foam and XPS or EPS boards) on the exterior side of the metal framed walls. Plastic insulation does not have a history of practical use in these exterior applications on high rise construction.
  - Increased use of combustible insulation will increase fire risk and fire propagation in the envelope. Test standards (NFPA 285 for one example) are not adequate for predicting how these products perform on real building fires when they are beyond the vertical reach of fire fighter ladders on high rises (over 75'). The possible consequences of such a forced choice are foreworn by recent dramatic building fires in the middle east, china and recently in London.
  - In addition, many of the foam plastic insulation products are dimensionally unstable with degraded longterm R-values.
  - The elevating of R-Values in these table and stretch code, and in particular "Ci" R-values, is a miscalculation that the predicted time to replace (upgrade) thermal components of opaque walls and fenestration shall far outlive other energy using components that may be replaced more frequently over time. It is my experience in the industry that while many older pre-war building enclosures demonstrated durability over decades, modern enclosure products are not designed nor have they shown similar durability. They will be upgraded and replaced far sooner than is generally understood. This provides an opportunity for energy upgrades in the next few decades.

- Roof top insulation: Table C402.1.3, Climate Zone 4, changed from R-30ci to R-35 (U- 0.028). We presume this is intentionally allowing the entire roof to be averaged to R-35, rather than requiring a R-35ci. Nonetheless, excessive roof top insulation would lead to heavy snow loads that may not be manageable by older / existing buildings, parapet walls / balustrades, building egress door sill heights are pre-defined, snow that is not melting can increase exponentially without adequate wind to blow it off, and this doesn't address what happens to roofing / flashing / drains which are allowed to be trapped under snow indefinitely. Many factors need to be considered but it is our opinion continuing on this path of increased insulation without proper preparation in the industry will lead to significant problems.
- The continuous insulation requirement for metal-framed cavity is being doubled from R- 7.5ci (Zone 4, 5, 6) to R-15.6ci (Zone 4 and 5) and R-17.5ci (Zone 6). This is a large jump. Enlarged exterior wall cavities to accommodate this insulation will have significant structural impact as cladding systems must cantilever further from the primary structure, and multiple layers of insulation will likely need to be supported. Energy studies show that substantial energy loss occurs through locations with low thermal

performance (higher U-factors) such as fenestration. Adding insulation at walls has diminishing returns when other building components perform much worse from a thermal standpoint.

- R60 stacked at attic floor framing may be achievable, but in a ceiling space may be impractical and restricted by the depth of the roof joists, and can complicate the installation of a continuous vapor retarder or air barrier system. Difficult to justify a 57% increase in insulation R-value unless supported by energy or cost benefit analysis. In addition, energy studies show that substantial energy loss occurs through locations with lower thermal performance (higher U-factors) such as fenestration. Adding insulation at roofs has diminishing returns when other building components perform much worse from a thermal standpoint.
- Tables must be revised to coordinate the values in each. The R-value requirements in Table C402.1.3 should correlate with the corresponding U-factor requirements using ASHRAE 90.1 Appendix A to ensure the R-values and U-factors are the intended stringency. Problematic differences currently in the proposed changes include: roof insulation, mass walls, metal framed walls above grade, wood framed and other walls above grade, below grade walls, as well as heated slabs on-grade floors. Many of the included footnotes must be updated in addition.
- Regarding the use of foam insulation, language should be incorporated that reinforces the other construction aspects, such as fire safety, should be considered while implementing the Stretch Code. The ASHRAE Handbook of Fundamentals recommends that foam insulation use aged values greater than one year.
- The proposed building envelope measures are pushing beyond the limits of present manufacturing industry technology – roof insulation requirements of R-60 will impact local zoning building height restrictions, and unachievable vertical fenestration insulation will require triple glazing which is limited in the overall size that can be manufactured. Only the IgCC and ASHRAE 189.1 use these values which are voluntary requirements for those buildings pursuing LEED accreditation.
- The values in the tables are not coordinated. The R-value requirements in many instances do not correlate with the corresponding U-factor requirements (based on standard constructions per ASHRAE 90.1 Appendix A). Therefore, it isn't possible to comment comprehensively, because it isn't clear whether the R-values or the U-factors are the intended stringency. Following is an illustrative list of differences found that need to be results.
- Consideration should be made in the tables should include provisions for roofing assemblies which are a combination of continuous insulation and cavity insulation, similar to metal and wood walls. Some of the attic insulation levels will not be attainable without a combination of the two, particularly in sloped roof assemblies.
- I'm guessing that the logic of requiring R-60 for attics in all climate zones is that it's about the same cost as, say, R-38 if it's loose fill attic insulation. However the extra thickness needed to achieve R-60 is onerous in the context of height limits in an urban condition such as NYC. For a steeply pitched roof it may not be a problem, but for a low slope vented attic it certainly is. R-38 is plenty for climate zone 4; it's not necessary to require more than that.
- CI should explicitly include the insulation in the clear thickness between double stud walls. For example, in a double stud wall built out of 2x4's with a total cavity of 12", the free thickness of 12 - 3.5 - 3.5 = 5" should qualify as continuous insulation.
- My partner _____, PE, RA, and I offer the following comment on the proposed NYStretch Code, particularly as it pertains to roof membrane replacements on existing tall urban buildings of the type common in NYC. On these buildings the roof area comprises a relatively small percentage of the total

building envelope in comparison with low-rise industrial or commercial buildings in found less urban portions of New York State.

- For existing buildings with an aggregate roof area of a specified maximum percentage of the overall surface area of the building envelope (e.g. 20% or less), the current minimum requirement in of R-30 in Table C402.1.3 - 2016 NYCECC should be maintained. The new R-35 requirement should be applicable to new buildings, and buildings undergoing significant alteration or addition.
- Triggered by the increase from R-30 to R-35, many more existing masonry parapets, and/or railings will have to be raised to meet the 42 in. minimum height above the roof wearing surface stipulated in the building code. *
- [*Note: With the change to R-35 from R-30, the minimum thickness of the type of insulation commonly used above the roof deck will increase from 5 inches to 6 inches. The impact of this change is further compounded by the requirement that, per the 2016 NYCECC, the low-point of the insulation above the roof deck (at roof drains) may only one inch less than the required minimum thickness of insulation to meet the R-35, or 5 inches. This will result in a significantly higher roof level at the perimeter, triggering the increase in parapet height.]
- For the tall urban buildings (where the proportion of roof area to overall surface area is significantly less than low-rise industrial or commercial buildings in less urban portions of New York State) the increase in energy efficiency would be marginal.
- It can also be argued that the benefit in energy efficiency provided by the increase in insulation thickness would be offset by the ?embodied energy? cost of demolition, removal, fabrication and transporting materials, etc., involved in reconstructing currently code complying parapets, adding guard rails atop masonry parapets, or replacing metal guardrails with new.
- As previously noted, on tall buildings, the roof represents a relatively small percentage of the envelope. Furthermore, on existing tall buildings, the currently required R-30, (and even previously required R-25), most likely far exceeds the overall R-value of the rest of the envelope. As demonstrated by the Table below. (We can provide more detailed case-study calculations, if requested.)
- Building Dimension Building Height Total Area of Envelope (Facades + Roof) Area of Roof Percentage Roof Area to
- Envelope
- (?P%?) ***Net R-value
- Improvement for additional inch insulation (%)
- 100 x 100 100 (10 sty) 50,000 10,000 20 3.3
- 100 x 100 150 (15 sty) 70,000 10,000 145 2.9
- 100 x 100 200 (20 sty) 90,000 10,000 11 2.2
- 100 x 50 100 (10 sty) 35,000 5,000 145 2.9
- 100 x 50 200 (20 sty) 65,000 5,000 8 1.6
- *** Net Building-wide R-value Improvement for an additional inch of roof insulation, (6 inches over 5 inches). This rough calculation, for demonstration purposes only, assumes a uniform R-value over the building of R-30 which is significantly more than exists in existing buildings.
- In conclusion, we believe that for existing tall buildings, the energy benefit of installing insulation with a minimum R-value of R-35 (rather than R-30), for roof membrane replacement projects on existing tall buildings would be outweighed by the financial and embodied energy costs involved in complying.

    - If the NYStretch code cannot be modified we suggest that the exception be promulgated in NYC, either by Rule, or Building Bulletin.
- R60 in the ceilings? that is a HUGE jump from R38, who is pushing for R60? I can tell you with certainty that the industry is NOT, the returns from R38 to R60 aren?t as quantifiable as the cost incurred and with an additional possibly 10? of insulation? for commercial properties, that this affects, we might be talking about losing a story because of the additional 10? of insulation when you are designing in NYC and their arcane building height restrictions, I would be against this b4 we even hit go,
- CZ - 6: Wood frame wall R-value for continuous needs to be increased or risk condensation forming on the interior side of the exterior sheathing. Both Energy Star and NYSERDA has recognized this as probable and suggest a higher continuous R-value.
- the increased insulation, especially on the exterior of metal stud cavities is a concept that needs to be pushed further into the industry, this code helps achieve that goal. (NExt step NO insulation in metal stud cavities?) Roof: R-40ci? We have found this to be an effective cost-to-savings tradeoff point.
- R60 is getting real excessive. there is a point of no return.
- I would like to specifically address the requirements stated in Table C402.1.3. which lists the R-35 requirement for "Insulation Entirely above roof deck". For polyisocyanurate insulation boards used in many low-slope systems, this equates to a 6.25" insulation thickness over a structural deck that already has a slope for drainage. For structural decks that are not sloped, complying with Table C402.1.3 would require 6.25" at the drains (low point) and additional thickness at high points of the roof to create the minimum 1/8" per foot pitch required by codes. Alternatively, Table C402.1.4 can be complied with, however, for roofs requiring pitch, it's possible that one foot thickness of insulation boards at high points might still be needed just to provide pitch. While the intention of "improving" energy code requirements may make sense in new construction and additions, the various nuances of performing alterations to existing construction are not thoroughly addressed. Simply installing insulation boards may not appear to be a "tall order" as a stand-alone item, nevertheless, the resulting architectural, structural, mechanical, electrical modifications that would need to be made in order to comply with a 6.25" minimum requirement could be an exorbitant task and could result in significant use of fossil fuels (i.e. trucking, mechanical demolition, material manufacture, etc.) and unnecessary creation of construction debris (which originally was in perfectly good condition) will end up in local landfills.
- R60: Has a cost analysis been done on this proposal to go from R-30 to R-60, and have stakeholders' opinions been solicited?
- The requirement of 15.6 to 17.5 for continuous insulation is a big jump from the perspective of cavity wall construction. This requirement translates into more than three inches of continuous insulation for extruded polystyrene or mineral fiber insulations. Three inches is the current practical limit for cavity wall construction, beyond which the requirements related to the brick ties get structurally more complicated and thus much more costly.
- The increase in stringency for Group R spaces is practically immaterial. Typically you won't find residential occupancies in below grade spaces in commercial buildings.
- It's not clear whether the R-5 full slab insulation is and additional or alternate compliance requirement.
- There is a large change in the requirements for each of the CZs except for CZ/Group R.
- Footnote h is puzzling. The following requirement is unclear: "Perimeter insulation is not required to extend below the bottom of the slab." This seems contrary to the requirements listed in C402.2.4 and C402.2.6 which seems to require the insulation to extend below the slab. ASHRAE also includes F-factor performance for fully insulated slabs separate from the perimeter insulation requirements.
- It is unclear how the F-factors correlate with the R-values listed.

- The Stretch Code should require that foam insulations use aged values greater than 1 year. Typical one-year aged polyurethane, polyisocyanurate, polyicynene and similar foams can have R=7 or somewhat higher. The ASHRAE Handbook of Fundamentals recommends R=5.6 to 6, after aging for several years.
- The Stretch Code should have language that reinforces the fact that insulating the building must not happen at the detriment of safety. For instance, the language could be: "While implementing this Stretch Code, all other construction aspects should be considered, including fire safety."

Action or Other Shown in Final Draft
• Updated R-value table based on assemblies listed in ASHRAE Appendix A and made non-mandatory by moving to informative appendix. • Regarding concern that the wood frame wall R-value requirement for continuous would increase or risk condensation forming on the interior side of the exterior sheathing we coordinated with industry expert Joe Lstiburek and determined that no action was needed.

NYStretch-2018 Code Section: Table C402.1.4 Opaque Thermal Envelope Assembly Maximum Requirements, U-Factor Method

Reference ID # for Comments received on Table C402.1.4:

d19b1034
d32357d9
d3253c78
d32599f0
d32699d0

Comment Text Received on Table C402.1.4:

- Table C402.1.4 Footnote "f" states, "the second value is for full slab insulation." However, there is no second value listed in the Table.
- Table C402.1.4 Footnote "h" states, "Steel floor joist systems shall be insulated to U-0.032." However, the table already requires U-0.033 for CZs 4 and 5. The difference is less than R-1. Is this difference really material and necessary? Also, for CZ6 the table calls for more stringent at U-0.027; is it the intent to diminish this requirement?

Action or Other Shown in Final Draft
• Footnote "h" has been corrected and properly referenced. • F-factors updated to single value reflecting how heat flows through a slab.

NYStretch-2018 Code Section: C402.1.4.2 Thermal resistance of mechanical equipment penetrations[1]

Reference ID
d3187eae

Comment Text Received on Section C402.2:

- The Res Code and Comm Code should both include requirements that through-the-wall AC's and PTAC's be included in the thermal resistance calculations of exterior walls, with a default U-factor of 0.5, as per the 2016 NYC amendments to the IECC, section C402.2.4.2. (Proposal to keep the commercial requirement and extend it to residential.)

Action or Other Shown in Final Draft
• Added Section C402.1.4.2 Thermal resistance of mechanical equipment penetrations to Final Draft to match requirements in the 2016 NYCECC

NYStretch-2018 Code Section: C402.2 Specific building thermal envelope insulation requirements (Prescriptive).

Reference ID # for Comments received on Section C402.2:

bc8a8e5b
d18b2a79

Comment Text Received on Section C402.2:

- Confirm if these prescriptive requirements apply if you are using the envelope trade off/component performance alternative/C402.1.5

Action or Other Shown in Final Draft
• No action required: by modifying the tables referenced by C402.1.5, that section is updated by reference.

NYStretch-2018 Code Section: C402.2.8 Continuous Insulation.

Reference ID # for Comments received on Section C402.2.8:

e570c543
e5802f1b
d18b2a79
d19b1034
d2ec5f2d
d2f9feac
d30a7238
d318e78a

[1] Section not included in draft published for Public Review

d32357d9
d3253c78
d32599f0
d32699d0
d334a91b
d34e16dd

Comment Text Received on Section C402.2.8:

- The proposed text in section C402.2.8 (prescriptive but applicable to all commercial buildings that do not do an energy model) is vague, open to interpretation, and likely to cause confusion. The language will leave practitioners guessing as to where to draw the line between minor detail deficiencies and thermally significant design flaws. The language will be very difficult, if not almost impossible, to enforce, due to resource constraints.
    - While "Continuous Insulation" is now defined in the code, and practitioners generally understand the concept of thermal bridges, the industry is not well-versed on how thermal bridges impact the performance of the thermal envelope. This language provides no guidance on how one must calculate the R-value of a thermal bridge (is it a parallel path analysis for every detail, must every detail be analyzed in Therm, Wufi, or other software?). This leaves the AHJ with the problem of establishing how certain components in an assembly must be calculated, and it places a burden on the AHJ to scrutinize an unpredictable number of details with already very limited time and resources. As written, the enforcement of this requirement is impractical.
    - Some thermal bridges may have negligible impact on an assembly (they don't compromise comfort, or thermal/moisture performance), depending on how it has been designed. Others have significant impact. This places burden on the applicant to prove that a thermal bridge that has an R-value of less than R-5 is not compromising the thermal performance of the envelope (though, technically, it would not be allowed at all, forcing an applicant to do an energy model for little to no value). The effort of the practitioner and the code official needs to be directed to components that are the most common sources of thermal deficiencies, rather than an unlimited investigation of every transition between assembly composition or penetration of the thermal envelope.
    - 3. Even the current acceptable modeling protocol does not require that every thermal bridge in the envelope be evaluated (and there is no limitation on minimum R-value of opaque elements under the performance path). So, projects that choose to model rather than follow a prescriptive path would not be required to evaluate the performance of thermal bridges, unless appropriate language is added or modified in Section 11 and Appendix G. The unintended consequence could be that buildings that follow the performance path find after occupancy that they have higher energy consumption than similar buildings that would follow the prescriptive path.
    - Recommendations- develop language that is easily understood and enforced for common thermal bridges that are likely to have a significant impact on the thermal performance of the building envelope. The proposed language does not give practitioners any direction in how to achieve compliance (in reality, this language is much more "performance" language than prescriptive). We believe these components are potential candidates for specific language: Exposed slab edges (must be insulated to at least R-5), column enclosures (must be insulated to

at least R-5), Balcony projection thermal breaks (required, otherwise the applicant must provide a Therm analysis or use the performance path, inputting the area as a "wall type"), Roof to wall intersection at parapet walls and/or roof setbacks (must be thermally broken, but language should establish how much), Brick shelf angles (must be cantilevered, or account for them with a Therm analysis), opening sills and lintels (???), and opaque spandrel panels within fenestration assemblies (clear direction on how to properly de-rate the panels or provide a Therm/Wufi analysis for each panel module, due to the thermal deficiency of mullions). If language for each of these common problems can be drafted, it would go a long way to meeting the intent of the section, without leaving this open to an unending investigation of every detail or penetration in an assembly. Such language may be more successful in advancing the use of details that have been proven to solve these problems. Possible approaches would include describing a minimum overlap of the insulation between the insulation layers of two adjacent components, a minimum performance of a thermal break, or a minimum distance between a thermal break and the conditioned space. Brussels has prescriptive language that may help with development. Once workable language is developed for the prescriptive path, determine how equivalent changes must be accounted in the modeling protocol, so they are appropriately included in trade- offs. As this provision is currently proposed, it is not feasible, workable, practical, or enforceable.

- Regarding the proposed addition of the new Section C402.2.8 (Continuous Insulation) "In new construction, no opaque portions of the building thermal envelope shall have an R-Value of less than 5." I recommend this provision not be accepted as it is nonsensical and impractical.
    - This proposed wording makes no practical sense, is poorly worded, and too prescriptive. R-Values are used for components and assemblies so this provision could be understood to include not only full assemblies (ex a brick masonry wall with insulation, ties and shelf angle) but also to the individual components such as the steel shelf angle itself. The term "portion" is vague. This provision should be sent back for more careful editing to be in any way enforceable. There needs to be some allowance for structural thru members that do not have R-5 or better thermal resistivity.
    - The approach should be focused on meeting the U-values on Table C402.1.4, when doing an area weighted average for the entire façade, to allow for some flexibility in design. It should avoid listing such specific requirements. As many common wall systems are assemblies such as curtainwall and window wall systems, opaque wall assembly U-factors should be considered instead of R-values or effective R- values. If the intent is to target specific conditions such as to thermally break concrete balconies, then recommend text to be specific for those conditions.
    - In addition, this proposed add if accepted as written that 'no portion' which has zero tolerance for non- compliance puts a tremendous burden on inspectors and inspection agencies who may be required (such as in NYC for Tr-8) to sign off that the energy code is met and based on a certain (say 15%) review of components. The only way this would be able to be enforced is with full-time and continuous inspection for energy code progress to ensure compliance. This would be very expensive with very little impact or value on reducing in energy usage of the building.
- We are experiencing a life safety component of energy conservation that has not been considered. There are dire consequences that will result if life safety is not considered when increasing the fuel components of foam plastics therefore we as that consideration begive to the definition of continuous insulation that should include fire blocking as exception from the continuous envelop so as flexibility can be granted to allow for a safer exterior envelop. Just a minor adjustment in this definition will save lives for now and in the future with minimum impact on energy conservation.

    - CONTINUOUS INSULATION (ci). In reference to the definitions in sections 28.2-ECR202 and ECCC202 allowable thermal bridges shall include assemblies required for compliance with chapters 7, 14 and 26 of the International Building Code for the State of New York
- Continuous Insulation: Table C402.1.3 or R402.1.2 Mass Wall R-value went from 8/13 to 21/21. Continuous Insulation of increasing R value = increasing thickness, which starts to become a life safety hazard. There is no known insulation which can achieve this level of R-value in a manageable thickness. At R 15.6, approximately 3" of rigid foam insulation is required, and at R-19.5ci, approximately 4" of rigid foam. The same in mineral wool would require approximately 3.5" and 5" respectively. This has the effect of extending the depth of the wall panel anchors / brick ties / anchor clips, beyond the depth of their typical use and testing. These requirements are pushing the limits of present day construction technology, in an unsafe manner, because there is no time allowed for design and testing, the code is being enforced immediately. The right approach is to advise the profession and the trades people / manufacturers of the more demanding requirements and allow everyone to alter the details to achieve the required depths. Note also that the R-value of foam insulation diminishes over time, so the R-value achieved at time of design / construction, will not be maintained throughout the life of the Building, and that also applies for most weather seals, and breaks. All products deteriorate, but the weather seals can be replaced, the breaks and insulation, not so easily.
- Include: No opaque doors shall have an R-Value of less than 5.
- Recommendation to use: TEMPERATURE DIFFERENCE COEFFICIENT (fRsi). The difference between the interior surface temperature of a component and exterior air temperature, divided by the difference of temperatures between interior air and exterior air.
- Does this refer to the effective R-value? Or the rated R-value for the insulation (e.g. in a stud cavity)? We advise using the effective R-value. Language needs to be amended to make this clear.
- Please confirm if the continuous insulation applies where there is an adjacent building condition. Often where there is an adjacent building it can be very difficult to insulate on the exterior so projects insulate from the interior, however this will mean that slab edges are uninsulated.
- The proposed text in section C402.2.8 (prescriptive but applicable to all commercial buildings that do not do an energy model) is vague, open to interpretation, and likely to cause confusion. The language will leave practitioners guessing as to where to draw the line between minor detail deficiencies and thermally significant design flaws. The language will be very difficult, if not almost impossible, to enforce, due to resource constraints.
    - 1. While "Continuous Insulation" is now defined in the code, and practitioners generally understand the concept of thermal bridges, the industry is not well-versed on how thermal bridges impact the performance of the thermal envelope. This language provides no guidance on how one must calculate the R-value of a thermal bridge (is it a parallel path analysis for every detail, must every detail be analyzed in Therm, Wufi, or other software?). This leaves the Authority Having Jurisdiction ("AHJ") with the problem of establishing how certain components in an assembly must be calculated, and it places a burden on the AHJ to scrutinize an unpredictable number of details with already very limited time and resources. As written, the enforcement of this requirement is impractical.
    - 2. Some thermal bridges may have negligible impact on an assembly (they don't compromise comfort, or thermal/moisture performance), depending on how it has been designed. Others have significant impact. This places the burden on the applicant to prove that a thermal bridge that has an R-value of less than R-5 is not compromising the thermal performance of the envelope (though, technically, it would not be allowed at all, forcing an applicant to do an

energy model for little to no value). The effort of the practitioner and the code official needs to be directed to components that are the most common sources of thermal deficiencies, rather than an unlimited investigation of every transition between assembly composition or penetration of the thermal envelope.

- 3. Even the current acceptable modeling protocol does not require that every thermal bridge in the envelope be evaluated (and there is no limitation on minimum R-value of opaque elements under the performance path). So, projects that choose to model rather than follow a prescriptive path would not be required to evaluate the performance of thermal bridges, unless appropriate language is added or modified in Section 11 and Appendix G. The unintended consequence could be that buildings that follow the performance path find after occupancy that they have higher energy consumption than similar buildings that would follow the prescriptive path.
- 4. There are common constructions where it is practically unachievable to meet the proposed R-value, whether it is an effective or normative value. Examples include, masonry slabs with shelf angles, brick return at windows in many cases, thermal break systems in balconies and roofs, concrete foundations at the connection with the wall above, and the framing of spandrel panels.

- Recommendations- develop language that is easily understood and enforced for common thermal bridges that are likely to have a significant impact on the thermal performance of the building envelope. The proposed language does not give practitioners any direction in how to achieve compliance (in reality, this language is much more “performance” language than prescriptive). We believe these components are potential candidates for specific language: Exposed slab edges (must be insulated to at least R-5), column enclosures (must be insulated to at least R-5), Balcony projection thermal breaks (required, otherwise the applicant must provide a Therm analysis or use the performance path, inputting the area as a “wall type”), Roof to wall intersection at parapet walls and/or roof setbacks (must be thermally broken, but language should establish how much), Brick shelf angles (must be cantilevered, or account for them with a Therm analysis), opening sills and lintels, and opaque spandrel panels within fenestration assemblies (clear direction on how to properly de-rate the panels or provide a Therm/Wufi analysis for each panel module, due to the thermal deficiency of mullions). If language for each of these common problems can be drafted, it would go a long way to meeting the intent of the section, without leaving this open to an unending investigation of every detail or penetration in an assembly. Such language may be more successful in advancing the use of details that have been proven to solve these problems. Possible approaches would include describing a minimum overlap of the insulation between the insulation layers of two adjacent components, a minimum performance of a thermal break, or a minimum distance between a thermal break and the conditioned space. The City of Brussels through its regional development agency adopted prescriptive language in 2011 that can inform development. Once workable language is developed for the prescriptive path, determine how equivalent changes must be accounted in the modeling protocol, so they are appropriately included in trade-offs. As this provision is currently proposed, it is not feasible, workable, practical, or enforceable.
- the code does not account for structural steel thermal bridge elements through the exterior enclosure (beams and columns) which are large heat loss and a surface for potential interior condensation. The code should recognize these elements in the definition of continuous insulation and/ or building simulations.
- This will likely conflict with the Building Code's requirements for NFPA 285 compliance in BC Chapter 14 where noncombustible blocking and/or edge treatments of the wall insulation are required. Unless,

there is a material out there that is: 1. noncombustible, 2. a thermal break, and 3. rigid enough to properly work in window frame/door frame assembly.

- There is a risk that the enforcement of the life safety requirements of the Building Code will not adequately address the potential for the increased fuel load of some continuous insulation materials, that would be required as a consequence of these higher energy requirements. The Application section 1.3 of NFPA 285 states that the test shall be used to evaluate fire propagation characteristics of exterior wall assemblies, and deviations from tested conditions may significantly impact the life-safety of occupants within the buildings enclosed by these wall systems. In order to address this, the following proposed statement is recommended for clarity: "When NFPA 285 test reports or listings are used for compliance to the fire provisions of the New York City Building Code, the quantity of combustible components shall not exceed those of the submitted test report."
- This proposed requirement is unclear as to whether this is an effective or normative value. Even if effective it cannot be met for many construction types. While reducing thermal bridging is important, a mandatory provision that applies to all details and all elements is too restrictive is as much as it's practically unachievable in all instances.

  Examples, of common constructions where it is simply not possible to meet this requirement include the following:
  - Masonry construction - the slab with shelf angle, even if cantilevered, cannot achieve R-5
  - Masonry construction – brick return at windows, in many cases, cannot achieve R-5
  - Balconies – even Isokorb or similar thermal break systems rarely achieve R-5, due to structural reasons (more common is R-2 to R-4)
  - Penetrations through roof (e.g., columns) – R-5 is exceedingly difficult even with structural thermal breaks
  - Concrete foundations at the connection with the wall above – there can be a necessary break in insulation for many types of details, depending on site conditions. In addition, while the spaces next to such foundations are likely to be considered conditioned, in reality in most instances they have very low temperatures being maintained (e.g., 40F).
  - The framing of spandrel panels – R-3 is probably the most that can be achieved.
  - In addition, this requirement would force calculations for very many building details, in majority with a tiny effect on overall heat loss, due to their very small area. It will pose a documentation, review, and inspection burden that is incommensurate with the results.
  - For people using the U-value tables, I propose that U-value requirement presents sufficient incentive to reduce the thermal bridging effect, since with thermal bridges one needs to greatly increase the insulation thickness elsewhere.

Action or Other Shown in Final Draft
• Requirements reformulated and more narrowly tailored to address specific thermal bridging issues, clarified for application and the CI requirement reduced to R-3 in order to improve the feasibility of the requirement based on available products.

NYStretch-2018 Code Section: C402.4 Fenestration (Prescriptive).

Reference ID # for Comments received on Section C402.4:

b75e513b
e570c543
e5802f1b
cfbd51b3
d143d3bd
d19b1034
d2d0abb4
d2d26e2d
d2ec5f2d
d2ec6a50
d2f9247a
d2fa091b
d2fa6b69
d2fafdd8
d2fbcb8f
d316309c
d318e78a
d32357d9
d3253c78
d32599f0
d3261dcf
d32699d0
d334a91b
d33f8b1d
d34e16dd

Comment Text Received on Section C402.4:

- It is important the requirements specify that the U values must be based on North American criteria using NFRC as an independent reference. Too often European companies are selected without the buyer understanding the U Value calculations used in Europe are different calculations and while the U values look impressively low they are not the same as North American values. It's important that is be highlighted as architects frequently miss this detail in selecting fenestration using U values as the differentiator.
- Section C402.4 should be amended to reference Section C405.2.3, not the subsection, Section C405.2.3.1. C405.2.3 includes the charging language for daylight responsive controls, while the subsection only includes the function of those controls.
- C402.4.1.1.3 should be amended to reference Section C405.2.3, not the subsection, Section C405.2.3.1. C405.2.3 includes the charging language for daylight responsive controls, while the subsection only includes the function of those controls.
- C402.4.1.2 is flawed because it is a remnant from before daylight responsive controls were required. C402.4 already requires daylight responsive controls. This section allows an increase in the skylight area provided that daylight responsive controls complying with C405.2.3.1 are installed. The only way this makes sense to allow more skylight area is if C402.4 references the charging language of C405.2.3, and

only this section, for increased skylight area skips the charging language and directs users to C405.2.3.1 the function requirements.

- C402.4.2.1 is redundant. C402.4 already requires the referenced controls.
- Section C402.4 should be amended to reference Section C405.2.3, not the subsection, Section C405.2.3.1. C405.2.3 includes the charging language for daylight responsive controls, while the subsection only includes the function of those controls.
- C402.4.1.2 is flawed because it is a remnant from before daylight responsive controls were required. C402.4 already requires daylight responsive controls. This section allows an increase in the skylight area provided that daylight responsive controls complying with C405.2.3.1 are installed. The only way this makes sense to allow more skylight area is if C402.4 references the charging language of C405.2.3, and only this section, for increased skylight area skips the charging language and directs users to C405.2.3.1 the function requirements.
- The proposed amendments should not be adopted. The combination of New York City's density and climate make it difficult for fenestration systems to meet the current IECC values without sacrificing the natural air and light required by the New York State Multiple Dwelling Law. The proposal will have a deleterious effect on affordable housing construction in particular.
- Not clear why significant upgrades are proposed for roof and continuous insulation in wall cavity, but only incremental upgrades in fenestration U-factors (where much of the energy transfer takes place - primary source of heat gains/losses through the envelope are through fenestration).
- IECC-2018 lists maximum SHGC for different facade elevations and projection factors. These values are based on energy and cost-effectiveness models (see PNNL studies) and there is a calculated benefit to them. Requiring a maximum SHGC (more stringent) for all projection factors and elevations removes any incentive to use projection factors when they are beneficial to the design. This may also result in higher energy costs because a low SHGC means losing out on free heating in winter.
- The proposed amendments to Table C402.4 would result in a substantial change to the approach taken in establishing the fenestration requirements for commercial buildings as compared to the current ECCC and the IECC:
    - The current ECCC Commercial prescriptive U-factor requirements in Table C402.4 for vertical fenestration only vary between the three types of fenestration -- Fixed, Operable and Entrance Doors -- consistent with the approach taken in the IECC since the 2012 version.
    - The proposed changes to Table C402.4 in the Draft NYStretch Code-Energy, however, would establish two different categories of fenestration, one for "windows rated in accordance with AAMA/WDMA/CSA 101/I.S./A440 (Class AW windows) and curtain walls" and a second for "all other vertical fenestration." Much more stringent requirements would be set for "all other vertical fenestration," while only minimal improvements would be adopted for the new Class AW/curtain walls category.
    - This proposed new approach would not be the best choice for the NY Stretch code at this time. Specifically:
    - We are concerned that this new approach is much too large a departure from the current ECCC and IECC and therefore has not benefitted from the careful and thorough consideration and evaluation that is an integral part of the process of developing and adopting these codes.
    - • We are concerned that adoption of this new approach will create confusion, gamesmanship and other code compliance and enforcement issues. Windows that do not meet the much more stringent U-factor requirements for "all other vertical fenestration" would likely be shoe-horned

into the much less efficient “Class AW/curtain walls” category. This would result in less efficiency.

- The ECCC and IECC set the same energy conservation target (U-factor and SHGC) for all vertical fenestration rather than creating different categories and allowing one category to substantially underperform another; departure from this fundamental framework for the stretch code has not been justified. Given the substantial amount of fenestration found in typical commercial buildings and its impact on commercial building energy usage, it is very important to get fenestration requirements right. We believe that the proposed stretch code is the wrong place to embark on an experiment with a substantially different approach that does not correlate well with the current ECCC.
- In addition to the change in approach already discussed, we identified other problems with the proposal:
- • First, the label in the table suggests that the weaker U-factors would only apply to Class AW-rated windows and curtain walls. The footnote, however, goes considerably farther, including “window wall” and “storefront” fenestration in the exception. Do curtain wall and storefront windows have to meet Class AW requirements in some fashion to qualify? Do all AW windows qualify, regardless of what type of window and/or how they are used? All of this is confusing at best. Moreover, the term “window wall” is not even defined in the ECCC or the IECC (unlike curtain wall and storefront) and inclusion of “window wall” would create a loophole that could be broadly construed to include almost all groups of commercial windows in a wall.
- • Second, if an exception with weaker values for Class AW is intended, why is the proposal not limited to buildings where Class AW windows are required to meet the local building code (instead of any window that claims an AW rating regardless of application)? Moreover, the proposal does not limit the windows only to those that are “rated, certified and labelled” as Class AW, leaving open the ability to claim qualification for the exception without actually demonstrating real compliance. Certification and labelling is a critical safeguard to avoiding false claims and assuring that the window performs as intended.
- To address these issues, we suggest a more conventional, straightforward approach to establishing improved fenestration requirements for commercial buildings, similar to the approach taken with residential windows in the stretch code proposal. Our recommendation would be to simply improve the U-factors and SHGCs in the current code, without creating new exceptions or categories. For example, the code could use the modest improvements (a 0.02 U-factor reduction) already proposed for the Class AW/curtain walls, but for all fenestration. A further improvement would be to use the proposed 0.34 U-factor for Fixed and 0.41 for Operable fenestration in climate zone 6 for all three climate zones (this would double the efficiency improvement in climate zones 4 and 5). This approach would further simplify the requirements, reduce confusion and increase economies of scale. We note that the state of California uses this type of approach, setting only one set of prescriptive commercial fenestration requirements for the entire state. Our recommended approach is illustrated below as Attachment A to these comments.
- As for the maximum SHGC requirement in the Table, we generally support the approach outlined in the draft, but strongly recommend lower, more efficient SHGCs. Specifically, we recommend considering a more aggressive maximum SHGC of 0.25, at least for climate zones 4 and 5. (At a minimum, the SHGC should be reduced to 0.30 to have a meaningful impact when compared with the current ECCC.) According to an analysis done by ICF International for the

model code process, a 0.25 SHGC in climate zones 4 - 6 would save between 2 to 5% in overall energy use over current ECCC values, depending on the building type and climate zone. A 0.25 SHGC is easily achievable – it already appears in the IECC for other climate zones for both commercial and residential windows, and has for many years. Moreover, a 0.25 SHGC requirement would likely result in little or no additional cost, since the same low-e coating necessary to meet the U-factor requirements will also satisfy this lower SHGC requirement. This lower SHGC will also provide important additional benefits beyond saving energy, such as lower building cooling loads (which will permit smaller, lower-cost HVAC systems), reduce utility summer electrical peak demands (and the need to build additional power plants) and produce more comfortable and livable buildings.

- Regarding the proposed Amendments to Table C402.4 Building Envelope Fenestration Maximum U-Factor and SHGC Requirements
    - I recommend this provision not be accepted. Similar to Comment #3, I recommend a more appropriate caps on U-Value and SHGC for fenestration. Fenestration systems in dense urban cities and climates such as NYC are already falling short of meeting the current ICCECC values without darkening the glass and reducing the sizes of windows for natural air and light to those barely meeting the minimum requirements of NYS Multiple Dwelling law. These proposed changes were obviously not informed by the window and glass technologies used in affordable housing applications where economic considerations limit the ability to use products that come at a significant premium.
    - SHGC – I recommend maintaining the current SHGC maximum of 0.40. Many popular and common low- e coatings would no longer be permissible if the SHGC is lowered to 0.35 (such as Solarban 60, Viracon VE1-2m). This will also put limitations on use of ultra-clear glass. There are plenty of code complying buildings with these coatings installed in NYC.
    - Also, given the relatively recent technical advances for higher performing coatings and various warm edge spacers, along with growing complexity of and well documented premature failures of IGUedge seals, the long term performance of a sealed insulated unit can be uncertain. This is borne out by the standard 10 year warranties of IGUs for buildings designed for 50 years and longer. As higher performance levels are demanded, the durability of fenestration components should be considered.
- Recommend adding an exception that increased SHGC is allowed where shown to have a winter heating benefit that is greater than the summer cooling losses on an energy cost basis. Or when the overall energy consumption is lower.
- It is assumed that there are multiple, readily available building products out there that currently meet these performance requirements and that a cost increase analysis has been done.
- the code does not account for structural steel thermal bridge elements through the exterior enclosure (beams and columns) which are large heat loss and a surface for potential interior condensation. The code should recognize these elements in the definition of continuous insulation and/ or building simulations.
- Why limit SHGC to 0.35, regardless of shading? Exterior shading, combined with higher gain glass (upwards of 0.5) is often used on high-performance buildings. Properly done, the high gain can offset heating substantially, while still limiting cooling loads.
- with the added emphasis on natural daylighting in the codes and skylights the codes should at least require R-10 insulation on skylight curbs.
- The 0.35 limit on SHGC, no matter the Projection Factor, is very problematic for the following reasons:

    - thermal modeling on Passive House Planning Package consistently bears out that high SHGC windows save energy in climate zones 4 through 6 in group R buildings, i.e. the saved heating energy outweighs the added cooling energy. In fact, solar heat gain through windows is critical to meeting the Passive House heating energy target.
    - limiting SHGC tends to lower visible transmittance, which leads to higher lighting energy use and lower occupant satisfaction.
    - triple glazed windows, critical to Passive House levels of performance, are normally imported from Europe, with glazing SHGC standard at 0.5 (around 0.35 whole window operable, and consistently above 0.4 for whole window fixed). This means that the most commonly used fixed windows, and in many cases operable as well, will be illegal. Lower gain glass is available, but typically with longer lead times and severe price increase.
- The SHGC limits of 2015 IECC should be kept the same in the stretch code.
- I think that the SHGC specification should be left up to the design team - very commonly in 'Passive House' projects we use 0.5 SHGC glass which is very common in imported European high-performance glass and this works well for Passive House certified projects. Limiting projects to 0.35 SHGC would mean that certified Passive House projects or other buildings where the team wants to utilize solar energy (in a limited fashion) would be detrimental. This decision (SHGC) should be up to the designers, not a prescriptive value.
- it is my opinion that the overall U-factor for fixed and operable windows is far too high, we need to push the industry (US suppliers such as Kawneer and EFCO) for more robust thermal breaks in aluminum framed storefront and curtainwall that can compete with manufacturers like Sch?co.
- SHGC should be as low as possible. (unless Passive House building) Glazing manufacturers achieve at least .27 on clear/clear double pane glazing with around 60% VT. This provides quality (not tinted) daylight while also having a drastic reductions in cooling loads for buildings that do not have ideal solar orientations, or disregard the benefits of exterior shading. (mandatory in the next code, or promote the benefits of projection factors?)
- This provision should not be accepted. A more gradual increase in performance over time is recommended for U-Value and SHGC for fenestration. Fenestration systems in dense urban cities and climates such as NYC are already falling short of meeting the current IECC values without darkening the glass and reducing the sizes of windows for natural air and light to those barely meeting the minimum requirements of NYS Multiple Dwelling law. These proposed changes do not appear to be informed by the window and glass technologies used in affordable housing applications where economic considerations limit the ability to use products that come at a significant premium.
- Why is this requirement for the ratio of SHGC included? It appears this could be amended simply require the automatic, multi-step controls should be sufficient. This provision could be amended.
- Based on this note in the table, AAMA 101 Class R, LC, or CW windows fall under the "All other vertical fenestration" category, and must meet a more stringent Ufactor than a Class AW window.
    - AAMA 101 does not have thermal performance requirements, therefore classifications are not governed by U-factor requirements; not clear how AAMA classifications are or should be related to U-factors. Footnote A is confusing - it suggests three categories:
    - 1. Class AW windows and curtain walls
    - 2. All other fenestration
    - 3. Curtain wall, window wall and storefront systems.

- Consider changing table to include three clear categories, rather than two categories with overlapping footnote (curtain wall in both categories 1 & 3).

Action or Other Shown in Final Draft
• Clarified the requirement headers to improve clarity and usability. • The NFRC standard requirement for U-factor and SHGC has been repeated in the table to prevent confusion over the introduction of the Class AW standard.

NYStretch-2018 Code Section: C402.4.6 Thermal breaks.

Reference ID # for Comments received on Section C402.4.6:

e570c543
e5802f1b
d19b1034
d2d0abb4
d2ec5f2d
d2f9247a
d2fa091b
d2fa6b69
d318e78a
d32357d9
d3253c78
d32599f0
d32699d0
d334a91b

Comment Text Received on Section C402.4.6:

- Regarding the proposed addition of the new Section C402.4.6 (Thermal Breaks) "A thermal break with a minimum R-Value of 3.8 shall be installed between window frames and opaque elements of the building structure." I recommend this provision not be accepted as it is poorly worded, too prescriptive and impractical. It is often times not physically possible to provide an R 3.8 between the perimeter of a window and its surrounding support element or structure. These joints are generally filled with sealant, flashing and other waterproofing components and occasionally a plastic shim or thermal insulation that does not come close to achieving R-3.8. Windows need secure anchoring to adjacent structure or more robust opaque components (walls). These anchors provide a structural function so are generally contain metals that may or not be thermally broken. As windows are rigidly shimmed back to structure using high density plastic or pressure treated wood shimming, a significantly sized joint (likely 3" or greater) will be required to meet an R 3.8, thus leading to increased difficulty of sealing the joint and increased potential for air leakage at that joint.
    - The provision does not account for what the window is made of. The provision makes more sense for aluminum windows than it would for wood or acrylic windows. The provision also presumes a certain relationship between the window and the adjacent wall, that depending on the configuration, a thermal break could be either very much needed or of no practical use. This provision is a better best practice but surely does not belong in an energy conservation code.

- Thermal Break: C402.4.6. Windows should be securely affixed to exterior walls, the R value of the intermediary material between window and building are nearly impossible to describe as they are mostly sealant, backer rod, waterproofing, metal anchoring clips, and air. In high rise curtain wall buildings, this may be something which can be addressed, but not readily in typical masonry buildings. In general, it is safer to ensure secure anchoring of the windows, and wait for the industry to develop the appropriate devices meeting the code requirements.
- Account for all potential thermal bridges.
- The term "thermal break" is misleading in this context because it seems to imply that the thermal break mitigates between the window and the opaque wall, as though heat were flowing from one to the other. This is because a thermal break normally provides insulation between two conductive elements, one inside and the other outside. In this case that's not what's happening as far as I can tell; rather it's insulation and air seal in the install gap around a window. Call it "window installation gap fill." Don't call it a thermal break.
- Thermal breaks should also be included for canopies, balconies and parapets
- It is unclear whether this requirement applies to the junction between the window head, sill and jams and connection wall around the openings, OR between the window frame and the backup wall, OR both. Regardless, structural and construction considerations make this requirement of R-3.8 between window and wall unfeasible in most situations of high-rise buildings. The windows need to be attached with metal connectors to the wall in many cases. The thermal bridging formed this way is significant enough that R-3.8 cannot be achieved without creating large gap between window and wall – which brings with it risks of air infiltration and water penetration. Actually, it may not be possible to take the attachments into account and achieve R-3.8. This provision does not take into account actual building details that in almost all cases have joints between windows and opaque assemblies. These joints are generally filled with sealant, flashing and other waterproofing components and occasionally a plastic shim or thermal insulation that does not come close to achieving R-3.8. In addition, the windows need secure anchoring to adjacent structure or more robust opaque components (walls). These anchors provide a structural function so are generally contain metals that may or not be thermally broken. The provision does not account what the window is made of. The provision makes more sense for aluminum windows than it would for wood or acrylic windows. The provision also presumes a certain relationship between the window and the adjacent wall, that depending on the configuration, a thermal break could be either very much needed or of no practical use. This provision is more about best practice and not about establishing code minimum performance.
- Proposed change: "C402.4.6 Thermal breaks. Insulation with a minimum R-value of 2.0 shall be installed between window frames and opaque elements of the building structure." This allows for ½ inch mineral fiber insulation, but does not refer to attachments, and does not significantly increase the gap size.
- The proposed minimum R-value of 3.8 is unfeasible in the construction of most high-rise buildings and does not account for the materials the windows are made from. It is unclear whether this requirement only applies to the junctions between window frames and backup walls. The minimum R-value for insulation should be 2.0 to allow for mineral fiber insulation without significantly increasing gape size.
- It is not clear where this thermal break is installed. Is this a thermal break for the window anchors? Or insulation that fills the gaps between window and adjacent opaque elements? Given that most windows need a gap between the frame and surrounding structure, the value of this provision may be limited. Would window manufacturers and designers accept insulation in the gap if it is compressible? How compressible? The added insulation may also void the window warranty because it impacts drainage around the window (particularly at the window sill). R-3.8 seems very specific - it would be helpful to

understand where this value comes from to offer a suggestion. A thermal break material between window frame and surrounding wall may complicate or interfere with a continuous air barrier transition from wall to window.

Action or Other Shown in Final Draft
• Deleted in Final Draft based on information from the comment period and lack of consensus on best material and details.

NYStretch-2018 Code Section: C402.5 Air leakage--thermal envelope (Mandatory).

Reference ID # for Comments received on Section C402.5:

bc7bee9c
d18b2a79
d32357d9
d3253c78
d32599f0
d32699d0
d34e16dd

Comment Text Received on Section C402.5:

- C402.5 Exception: "New buildings not less than 25,000 square feet and not greater than 50,000 square feet, and less than or equal to 75 feet in height, must show compliance through testing in accordance with Section C402.5.1" should refer to C402.5.9 (or C402.5.9 needs to be changed to C402.5.1)
- The exception for buildings 25-50,000 SF and less than 75' in height was adopted for 2016 NYC ECC. Feedback from NYC DOB should inform how this has been received and executed. Suggest broadening range of buildings captured to up to 150,000 SF and less than 125' in height. Or at a minimum, require all buildings less than 50,000 SF.
- Exception 7 allows air curtains in lieu of vestibules. How well do those work in high rise buildings, especially those 30+ stories? It's my understanding that they can't handle that level of stack pressure. Maybe this should be allowed only in buildings less than a certain height.

Action or Other Shown in Final Draft
• Edited language for greater clarity by eliminating the exception format.

NYStretch-2018 Code Section: NYStretch-2018 Code Section: C402.5.9 Air Barrier Testing.

Reference ID # for Comments received on Section C402.5.9:

d18b2a79
d32357d9
d3253c78
d32699d0

Comment Text Received on Section C402.5.9:

- The wording in this section, and in the accompanying exception to C402.5 are ambiguously worded. It is assumed the reference to testing in accordance with C402.5.1 in the exception is intended to say C402.5.9 (since there are no testing requirements contained in C402.5.1) The exception should be

moved into C402.5.9 to clarify that the requirement for testing applies ONLY to buildings in the size range specified in the exception. The reason for restricting this section to buildings in the size range is that the testing is impracticable in buildings of greater size, and the allowable leakage is much greater than that achieved for most curtain wall systems. Allowing testing as a compliance path for large buildings could have the perverse effect of making buildings leakier.

- A critical section missing in the current IECC 2015 and NYS supplement, an excellent addition that will see immense improvements in building performance. It should be mandatory, in my opinion.
- The exception makes reference to Section C402.5.1 for air testing requirements. Is this intended to reference C402.5.9?
- The Joint Organizations expect the implementation of this amendment to be costly. The Joint Organizations would ask that decisionmakers not only consider the effect of individual amendments on cost, but also the effect of aggregate additional costs for multiple proposed amendments which may make their implementation cost prohibitive to many of our members, as well as to others in the building construction industry and in operating commercial buildings. Proposed building envelope changes will be a challenge to existing technology and result in overcompensating in the use of insulation in the hope of obtaining mandatory results that are in fact unachievable.
- The wording in this section, and in the accompanying exception to C402.5 is ambiguous. It is assumed the reference to testing in accordance with C402.5.1 in the exception is intended to say C402.5.9 (since there are no testing requirements contained in C402.5.1) The exception should be moved into C402.5.9 to clarify that the requirement for testing applies ONLY to buildings in the size range specified in the exception. The reason for restricting this section to buildings in the size range is that the testing is impracticable in buildings of greater size, and the allowable leakage is much greater than that achieved for most curtain wall systems. Allowing testing as a compliance path for large buildings could have the perverse effect of making buildings leakier.
- This exception should be numbered "C402.5.9".
- Not clear why Sections C402.5.4 and C402.5.8 are not included

Action or Other Shown in Final Draft
• Renumbered and reworded for clarity.

NYStretch-2018 Code Section: Amendments to Section C403.7.4 (Energy recovery ventilation systems (Mandatory))

Reference ID # for Comments received on Section C403.7.4:

e570c543
d2fc4c0b
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C403.7.4:

- In residential high-rise construction there are many situations where 100% outside air is supplied to apartments and sometimes to corridors. There is no return. Pressurization is necessary to avoid stack effect, so the exhaust can be significantly less than the supply. I propose the following language: 12. For

residential buildings with 100% outside air supply, the energy recovery system shall have the capability to provide a change in the enthalpy of the exhaust of no less than 50% of the difference between the outdoor air and exhaust air enthalpies, at design conditions. Exhaust is defined per exception 8.

- Two comments: 1) It's not clear how commonly heat recovery systems will be required because Table C403.7.4 (1) and C403.7.4 (2) are not shown. 2) Enthalpy is a suitable metric for selecting good performance; however I'm concerned that professionals will struggle with calculating it, and building officials will struggle to vet it during the permitting process. Best would be to reference a metric that is normally measured and reported by a third party, such as Sensible Recovery Efficiency (winter, use 32 F outdoors) and Total Recovery Efficiency (summer), according to CSA C-493.
- Air energy recovery presents extreme maintenance management issues that can complicate energy savings, air quality, and tenant comfort. For example, special care is needed to avoid damaging the faces of heat exchangers while washing them as such damage will result in the loss of airflow or energy performance. Some of the technologies, such as thermal wheels, have a short operational useful life that makes them untenable. Operationally, air to air heat plate exchangers generally work better, can be easily cleaned, and continue to operate long after thermal wheels have ceased operating.

Action or Other Shown in Final Draft
• Reached out to NYC DOB regarding comment that proposed exception #12 in cases where there is no return. Their reponse was as follows: The Stretch Code draft language for the ERV Section C403.7.4 exception 8 was taken from the 2016 NYCECC Section – the intent behind our modification was to require multifamily buildings to have ERVs if they are within 30 feet of a supply unit. We have not had issues with the interpretations of the section nor have we had complaints from the industry – so I think the language is OK as it is written in the draft Stretch and no modifications are needed.

NYStretch-2018 Code Section: Amendments to Section C403.8.1 (Allowable fan horsepower)

Reference ID # for Comments received on Section C403.8.1:

d1378db8
d18b2a79
d2ec5f2d
d32357d9
d3253c78
d32599f0
d34e16dd

Comment Text Received on Section C403.8.1:

- For Option 1 - fan power, we recommend revising the units to horsepower (HP) in lieu of watts.
- The amendment shifts a requirement that has historically been in Horsepower, and instead changes it to watts. Because this compliance path (option 1) regulates on the basis of motor nameplate power, watts is not a valid method. The table should remain in Horsepower. In addition, there is no data provided showing that reductions from the 2018 IECC values of 20%. In fact, the 2018 IECC values have not changed in several code cycles, indicating that there is little room for further reductions. Finally, the values in option 2 remain the same, meaning that most projects will continue to use option 2, resulting in zero energy savings. It is recommended that the values be restored to those in the 2018 IECC table as written.

- Note that Option 2 is related to brake horse power which is also a measure of power consumption (versus rated capacity related to nameplate power). Thus, this arbitrarily complicates compliance relative to plan reviews and field verification since input watts are not provided with design or field documentation, and is simply a different measure for information already available and required. This is particularly so since the code stipulate brake horse power include belt and drive losses, and the code also regulates motor efficiency as the only remaining factor relative to input power. Regarding rated versus operating motor efficiency, the code already limits oversizing of motors such that rated efficiencies will be reasonably close to the design capacity for fan motors. Additionally, the code requires the motors meet minimum efficiency values which are often bettered. There is no clear derivation for the values chosen for the requirement relative to the current code values. And the Option 2 requirements have not been changed making the stringency for all practical purposes unchanged. Proposed change: The Nameplate wattages should be restored as Option 1 for compliance. Any reductions in fan power should be addressed via Option 2 via brake horsepower allowances. This would make the change more transparent. Additionally, the basis for the change should be supported since meeting fan power limits is already challenging for many projects.
- The proposed amendment provides for limited responsiveness for high-pressure systems and are expected to present challenges with systems such as Active Chilled Beams, which are similar to induction systems. For a comparison of the higher energy usage of Active Chilled Beams versus Variable Air Volume Reheat, see page 29 of the attached linked article entitled “VAV Reheat Versus Active Chilled Beams & DOAS.” In addition to the prescribed allowable fan power exceptions, the Joint Organizations recommend including additional exceptions for use types requiring 24-hour needs, such as the central fan systems of other health care-related uses, data centers, and laboratories, due to the difficulty of such buildings meeting the prescribed allowable fan horsepower all of the time.
- This whole requirement may be overlooked unless something (Like CFMs and A and CV vs VAV and option 1 vs option 2) are required to be shown on the drawings.

Action or Other Shown in Final Draft
• Converted Watts to Horsepower using the SI conversion values listed in the code. • Deleted CFM_x footnote • Calculated new values for Option 2 using same values (0.8 Watts for VAV and 0.65 for CV systems) used to calculate Option 1. The values used as the basis for the updated hp and hbp are based on values published in The New Construction Guide and ASHRAE 50% Design Guide. • Added exception for active chilled beams.

NYStretch-2018 Code Section: Amendments to Section C404.2.2 (Service water system efficiency).

Reference ID # for Comments received on Section C404.2.2:

b1f96578
b56fbad3
bc8a8e5b
d32599f0
e570c543
d1378db8
d18b2a79
d2ec5f2d
d306cae4
d32357d9
d3253c78
d34e16dd

Comment Text Received on Section C404.2.2:

- C404.2.2 calls for at least 40% of the annual service water-heating requirement serving residential occupancies, commercial kitchens and laundries to be provided by on-site renewable energy or site-recovered energy. The intent is to allow compliance through a combination of CHP waste heat recovery, thermal solar collectors, condenser heat recovery, and drain water heat recovery (DWHR). However, buildings may have limited compliance options due to inherent design constraints. For example, high-rise buildings are usually not able to utilize thermal solar due to limited roof area, CHP and thermal solar may not be applicable to multifamily building with in-unit water heaters, and published studies suggest that savings from drain water heat recovery in multifamily buildings are significantly lower than required by C404.2.2. In addition, DWHR is not currently used in NY even on high-performance high-rise residential buildings. It is also unclear how C404.2.2 can be enforced for projects utilizing DWHR units.
- In accordance with the revised section C404.2.2, the revision would require the installation of on-site renewable energy or site recovered energy for service water heating regardless of the service water load within the building. This could significantly affect the cost and operation of a system for smaller developments although falling into the commercial category. Consideration should be given to provide limitations on size of the building/development which would require compliance with this section.
- C404.2.2 Service water system heating energy recovery in kitchens or laundries by waste water heat exchangers can only use clear water having no particulate, which is not possible or practicable in these cases, and the on-site renewable option in NYC does not have sufficient roof top solar panel access space.
- The requirement is not feasible. It mandates that In new buildings, not less than 40% of the annual service water-heating requirement serving residential occupancies, commercial kitchens and laundries shall be provided by on-site renewable energy or site-recovered energy. This ensure that cogeneration must be used in almost all high-rise buildings. I propose to closely fashion this requirement as follows:
    - This requirement applies only to buildings with unshaded roof area that can accommodate the PV necessary to provide the electricity.
    - Where cogeneration is provided in residential occupancies, commercial kitchens and laundries, recover at least 90% of this annual heat production, or recover its heat for all the domestic hot water and service hot water.

- Suggest clarifying that this section does not apply to Tenant fit-out projects in a new building, where the Tenant scope of work is separate from the core and shell scope of work.
- The proposed text for Section C404.2.2 requires that ALL new buildings with residential occupancies, in both the ECC and ASHRAE provisions, are required to have not less than 40% of the annual service water-heating provided by on-site renewable energy or site-recovered energy. The majority of new building construction in NYC will be impacted by this requirement since the residential occupancies comprise a high percentage of new construction. This provision would require all projects, except those pursuing energy modeling, to show compliance through a combination of cogeneration waste heat recovery, solar thermal collectors, condenser heat recovery, and drain water heat recovery (DWHR).
    - Issue #1 – Feasibility
        - high-rise buildings are usually not able to utilize solar thermal due to limited roof area
        - Cogeneration waste heat recovery and thermal solar may not be applicable to multifamily building with in-unit water heaters
        - Cogeneration systems may require large storage tanks (and additional mechanical room area) in buildings to store recovered hot water
        - DWHR is not currently used in NYC for multifamily buildings, indicating lack of familiarity and acceptance by NY design professionals.
        - There are no studies that demonstrate applicability of DWHR to high-rise multifamily buildings published studies suggest that savings from drain water heat recovery in multifamily buildings are significantly lower than required by C404.2.2 and thus cannot achieve the 40% recovered energy
    - Issue #2 – Cost Effectiveness
        - Cogeneration systems may be cost prohibitive for smaller multifamily buildings
        - Published studies suggest that savings from DWHR will not achieve the 40%, but in order to do so dedicated insulated drain water risers would be required, increasing cost
        - High efficiency SWH may obtain similar actual savings
    - Issue #3 – Enforcement
        - Annual service water heating consumption is based on parameters not regulated by the energy code: occupant density, usage, and equipment in a facility (i.e. number of showers, sinks, dishwashers, clothes washers)
        - Determining 40% site-recovered service water heating requires a calculation that is not defined by the code and subject to interpretation by design professionals and code enforcement
- The requirement is simply infeasible. It mandates that in new buildings, not less than 40% of the annual service water-heating requirement serving residential occupancies, commercial kitchens and laundries shall be provided by on-site renewable energy or site-recovered energy. This essentially mandates that solar thermal, CHP or chiller-heaters be installed in all of these types of projects. This would represent a design change and would be a particular cost burden for low-income housing.
- This is onerous in a dense urban environment because a) site-recovered energy is minimal compared to DHW demand, even in the hottest zones in NY State, and b) solar access is limited for many buildings, especially in dense urban environments.
- Further, it's complicated to predict that 40% of heating would come from a given energy recovery or renewable energy system. How would this be reliably proven to the code official?

- Lastly, renewable energy is not exclusive to service water heating in its usefulness, so it's too specific to mandate in this fashion. It would be better to mandate renewable energy systems, with reasonable limits to allow for buildings with poor solar access.
- There are a few options shown in the PNNL report in support of this section. Drain water heat recovery can make sense in single-family homes, or even low-rise residential, but does not seem appropriate or practical for high-rise/commercial construction. The typical approach is to recover heat from the shower drain to "preheat" cold water feeding the same shower mixing valve. However, given the riser piping arrangement in these buildings, this would result in other nearby spaces receiving "preheated" cold water, which may supply their bathroom faucet or toilet. Not only would this reduce or negate the efficiency benefit from "recovered energy," it could lead to increased water use as the tenant may run the faucet longer waiting for the cold water to arrive. It would also lead to complaints, as people expect their cold water to be cold. Avoiding the interconnection between spaces in a large building would require such extensive piping work as to make this completely not cost effective. Also, solar thermal will likely not have any significant impact in high-rise buildings due to space constraints vs. load.
- Service water system efficiency is proposed to require a minimum of 40% of the annual service water heating load to be from on-site renewables or site-recovered energy.
    - If on site renewables, can this count toward the new C409.2 on-site renewable energy requirement?
    - For a building who wants to be all electric, but does not have space for on-site renewables, and doesn't want to burn fossil fuel for site-recovered energy, can an off site renewable purchase or community renewable partnership be an alternative compliance for this requirement?

Action or Other Shown in Final Draft
• Modified charging language so requirements apply only to projects with an input rating >1,000,000 and added new section that applies to R-1 and R-2 buildings. • Restructured and modified language to allow for additional compliance paths in addition to SHW and solar thermal. This includes the use of efficient equipment (94 Et/EF). • Reduced solar/heat recovery component to 25%

NYStretch-2018 Code Section: Amendments to Section C405.2.1 (Occupant sensor controls).

Reference ID # for Comments received on Section C405.2.1:

ec36e6b5
d18b2a79
d2d0abb4
d32357d9
d3253c78
d32599f0
d341c937

Comment Text Received on Section C405.2.1:

- Address the need of the sensors to penetrate to all areas of the restroom to include individual stalls so no one is caught, when the lights turn off, outside of the sensor reach, thus in the dark without ability to turn lights back on.
- The addition of Dining Areas to the list of spaces requiring occupancy control creates issues of practicability. Dining areas are often open spaces with high ceilings and without columns on which to

mount sensors. In addition, having occupancy control in restaurants will achieve little savings, as the rooms are continuously occupied during hours when the restaurant is open.

Action or Other Shown in Final Draft
• Sensors in restrooms is a base code provision so no action taken. • The decision to include Dining Areas was made after the measure was reviewed by outside group.

NYStretch-2018 Code Section: Addition of new Section C405.2.1.4 (Occupant sensor control function for egress illumination).

Reference ID # for Comments received on Section C405.2.1.4:

d2d0abb4
d32357d9
d3253c78
d32599f0
d341c937

Comment Text Received on Section C405.2.1.4:

- NO. This could be problematic for required emergency means of egress illumination that is not in the direct line of sight or is blocked by obstructions, especially by a smoke filled space. This one will not fly with any local Fire Departments. This may be one instance where the Energy Code "crosses the line" between energy savings and life safety.
- The automatic shut-off of the lighting when the egress areas served by the illumination are unoccupied is not well thought out, as it ignores the obvious need for a minimal amount of lighting in many of these areas so that the safety strips (i.e. photo-luminescent markings) required by the fire code on steps remain visible. Bi-level sensors are preferable and usually recommended for such egress illumination areas.
- Either delete this section, or update as proposed here: https://seamlessdocs.s3.amazonaws.com/attachments%2FCO18031000054144619%2F0E9LQPkNQbWDKdHjUofS_NY+Stretch+Comments+2018+04+02.pdf

Action or Other Shown in Final Draft
• Modified requirement to automatically reduce lighting power by 50% when unoccupied for a period longer than 15 minutes. • Added exception for emergency lighting meeting Section 1008.3 of the IBC.

NYStretch-2018 Code Section: Amendments to Section C405.2.3 (Daylight responsive controls)

Reference ID # for Comments received on Section C405.2.3:

cfbd4952
d2d0abb4
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C405.2.3:

- (In loading language) only the general lighting should be required to be daylight responsive. Referring to the electric lighting includes lighting that is exempt is section C405.3.1 and Additional interior lighting power in C405.3.2.2.1.
- Reduce to 120 watts to make this requirement 20% better than IECC 2018.
- In #1, *general lighting* is a defined term. The italicized text indicates this. The explanation that general lighting does not include lighting that is required to have specific application control is superfluous. Further, this lighting is specifically listed as exempt in Item 2, below.
- In #2, only general lighting should be required to be daylight responsive. It does not make sense that exempt lighting applications would be required to be daylight responsive. Additional lighting power for decorative is used for many functions like cove lighting on ceilings that never receive daylight.
- In #4, the formula is too confusing to be useful.
- As a stretch code that targets lighting power allowances in the base code, Option 2 in C406 should be eliminated. So, it cannot be used in LPA_{norm} definition.
- In C405.2.3.2 Sidelit zone, often the ceiling height is lower than the full height of the fenestration: New construction sometimes chooses to hold back the dropped ceiling from the curtain wall, using vision glass, not spandrel glass for a more seamless effect. In retrofit of existing buildings, the existing window height was often very high because there was almost no plenum depth. A lower plenum with centralized HVAC may require a ceiling height lower than the full height of the fenestration. The fenestration height counted should be below the ceiling. Increase the lateral sidelight dimension to one-held the head height of the fenestration to capture more spaces. See suggested edits.
- Exception #3 is being changed from A-2 to A-3. Why? Should we expand upon this and list which A (Assembly) occupancies are exempt?
- The exception for dwelling/sleeping units, which has been removed from this amendment, should be restored, as installations for such units for such areas are extremely uneconomical. In addition, the carbon footprint to manufacture these daylight responsive controls more than offsets any expected savings from their use.

Action or Other Shown in Final Draft
• Terms of electric lighting as well as other comments regarding daylight zone definitions and formulas are existing language in the 2018 IECC. • A-3 in Exception #3 was a typo – it has been correct to A-2.

NYStretch-2018 Code Section: Amendments to Section C405.2.6 (Exterior lighting controls).

Reference ID # for Comments received on Section C405.2.6:

d18b2a79
d2d0abb4
d32357d9
d3253c78

Comment Text Received on Section C405.2.3:

- This section has the potential of significantly reducing safety and security in outdoor parking areas as a result of the mandated 50% reduction in lighting power. In addition, there is no information about the practicability or maintenance concerns with how a system that detects "activity" in a parking lot would function. Recommend wording that allows a security/safety exception to this requirement.
- Safety and security as exceptions should be restored to the amendments language. To state the obvious, if the absence of lighting creates a safety or security hazard, then there should be an exception for such circumstances.
- What about requiring all exterior lighting controls to have the capability to collect solar power at the location of the individual light; for example, parking lot or landscaping lighting that is not otherwise required by code?

Action or Other Shown in Final Draft
• No exception were removed as Section C405.2 in the 2018 IECC contains an exception for "Areas designated as security or emergency areas…" that applies to this requirement. No changes made.

NYStretch-2018 Code Section: Addition of new Section C405.2.6.5 (Outdoor parking area lighting control).

Reference ID # for Comments received on Section C405.2.6.5:

d18b2a79
d32357d9
d3253c78

Comment Text Received on Section C405.2.3:

- This section has the potential of significantly reducing safety and security in outdoor parking areas as a result of the mandated 50% reduction in lighting power. In addition, there is no information about the practicability or maintenance concerns with how a system that detects "activity" in a parking lot would function. The Joint Organizations recommend wording that allows a security/safety exception to this requirement.

Action or Other Shown in Final Draft
• Section C405.2 in the 2018 IECC contains an exception for "Areas designated as security or emergency areas…" that applies to this requirement. No changes made.

NYStretch-2018 Code Section: Amendments to Table C405.3.2(1) (Interior lighting power allowances: building area method) and Table C405.3.2(2) (Interior lighting power allowances: Space-by-space method).

Reference ID # for Comments received on Tables C405.3.2(1) and C405.3.2(2):

bc8a8e5b
cfbd4952
d16ef719
d2d0abb4
d32599f0
d33f9202

Comment Text Received on Tables C405.3.2(1) and C405.3.2(2):

- Table C405.3.2(1) and table C405.3.2(2) contain lighting power allowances essentially the same as ASHRAE 189.1- 2017 and the IgCC – 2017. The entire (industry?) has essentially avoided adopting these minimum lighting requirements due to their stringency as well as a fear of safety concerns for resulting inadequate occupant work space and egress visibility.
- Reduce LPA in Auditorium Audience seating to 0.59 w/ft2. It was not reduced like others
- Allowance of 1.34 for the audience seating area in a performing arts theater is an excessive reduction from the 2.43 w/sf allowed in IECC 2015. If trying to further reduce the allowance in IECC 2018, at 2.03 w/sf, an allowance of 1.70 would be appropriate. That is 30% lower than existing code of 2.43. These seating areas usually have dark finishes with no surface reflectance. Additionally, most of the time the space is actually in use, the lights are OFF.
- Why was the LPA for sports arena reduced by 0.01 w/sf?
- Previous LPA for Classroom was 1.24 w/sf. Reduction to 0.74 is too severe. IECC 2018 allowance of 0.96 is more than 20% reduction. It might be acceptable to reduce to 0.87, a 30% reduction from 1.24 w/sf.
- Previous allowance for Conference/Meeting/Multipurpose was 1.23 w/sf. The IECC 2018 reduction to 1.00 w/sf would be more appropriate.
- Hospital corridors usually require significantly higher illumination levels. A reduction to 0.88 w/sf would be more appropriate.
- In IECC 2015, Bar/lounge dining allowance was 1.07. A reduction to 0.62 is not feasible. IECC 2018 allows 0.93. The stretch code should allow no less than 0.80, a total 25% reduction from the current code.
- Family dining was previously 0.89 w/sf. IECC 2018 allows 0.71. An allowance of 0.54 is not feasible. The stretch code should allow no less than 0.67 w/sf, a total 25% reduction from the current code.
- An allowance of 0.39 w/sf for the Electrical/mechanical room is less than half the allowance in IECC 2015. The allowance of 0.43 in IECC 2018 matches ASHRAE 90.1 - but ASHRAE has an additional allowance for separately controlled lighting that IECC does not.
- A reduction to 0.92 is not feasible. Compare that to the allowance for a classroom laboratory, below. An allowance of 1.00 w/sf or, 1.04, like the lab, is more appropriate.
- The allowance for classroom laboratory was reduced by 27% from the existing code, IECC 2015 The allowance for other laboratories should not be reduced by a greater percentage. An allowance of 1.32 would be 27% less than the current allowance of 1.81 w/sf.
- The allowance for Laundry washing area was not revised at all. Perhaps 0.39 would be acceptable.

- LPA for an Elevator lobby actually increased from IECC 2015 to IECC 2018 because the ASME code requires 15 fc at the lobby threshold of an elevator. Calculations using a 100% LED solution found 0.68 w/sf to be appropriate. Allowing for technology improvements since 2018 development an allowance of 0.52 w/sf is not sufficient. 0.59 w/sf is more appropriate.
- The LPA for a lobby in a facility for the visually impaired should be approximately double the allowance for other lobbies. Since Otherwise is proposed as 0.86, the appropriate allowance would be 1.60 w/sf.
- Hotel lobby allowance was previously higher than the otherwise category and should remain so. The 2015 allowance was 1.06 w/sf. No less than 0.91 is appropriate.
- Similarly, the LPA for a performing arts theater lobby was previously higher than for the Otherwise category and should remain so. In IECC 2015, it was 2.00 w/sf, proposed to be reduced to 1.70 w/sf in 2018. The LPA in the stretch code should be no less than 1.40 w/sf, a 30% reduction from 2015. This is double the 15% allowance reduction in IECC 2018.
- The allowances proposed for lounges are not feasible. They are in excess of 40% lower than the allowances in IECC 2015. Appropriate allowances would be no less than 30% lower, as shown, 0.65 for healthcare facilities and 0.51 w/sf otherwise.
- The allowances for offices are too restrictive, not allowing any flexibility. 20% reductions: 0.88 w/sf is more appropriate for enclosed offices and 0.80 for open plan.
- The allowance for pharmacy areas is too restrictive. This area is similar to a laboratory and should be at least 1.30 w/sf. which is more than a 20% reduction from 2015.
- The allowances for restrooms are too restrictive. The proposed allowance for a facility for the visually impaired is more than a 30% reduction. 0.93 w/sf is more than a 20% reduction and is feasible. The Otherwise category should be no less than 0.80 w/sf.
- The proposed allowance for Sales area is in excess of a 25% reduction from IECC 2015. 20% reduction to 1.15 w/sf would be more appropriate.
- Seating area, general, should have an allowance similar to Audience Seating, Otherwise, category at 0.40 w/sf.
- In Stairwells, reduction of no more than 20% from IECC 2015 is acceptable, therefore 0.55 w/sf.
- Add a space type for Small Storage <50sf, with an allowance of 0.87 w/sf. Small storage rooms, such as closets, cannot suffice with the allowance of 0.43 w/sf.
- For workshops, a reduction in the allowance to 1.11 w/sf is already a 30% reduction from IECC 2015.
- The reductions proposed for Facilities for the visually impaired are excessive. The reductions proposed for Chapel in IECC 2018 was already less than 50% of the IECC 2015 allowances, and may in fact be too little. Provide no less than 1.06 w/sf in a chapel. The allowance for a recreation room should be no less than 1.70 w/sf, almost a 30% reduction.
- An allowance of 0.84 is a 30% reduction from the IECC 2015 allowance of 1.2 w/sf.
- All of the reductions proposed for LPA in a healthcare facility are too extreme, many are 30% less than IECC 2015. The only exception is Nursery that went up in 2018. The nurse's station allowance should be no less than the Office allowance. The patient room allowance was not reduced in IECC 2018 from 2015 because it was already extremely low. The allowance of 0.45 is not reasonable.
- Allowances for Library areas are too low. Reading area should be no less than Open Office at 0.80. Stack areas should be no less than Pharmacy and Laboratory, other. Stack areas should actually be higher because it is the only one with an IES vertical fc recommendation at 12" AFF.
- Allowances for Manufacturing facility were not reduced consistently from IECC 2015. These proposed allowances are all 30% lower.

- The allowances for Museum in 2018 were not reduced from IECC2015 because it was deemed that LED lighting with superior color rendering should be used. An argument could be made that the general lighting in the exhibit areas does not require superior color rendering, so a reduction to 0.74 could be acceptable. However, for Restoration Room, the best color rendering is needed, so no reduction from the current allowance is warranted. High color quality LED is 25% less efficient than other LED.
- Should be the same as Retail dressing room, below, 0.49 w/sf
- Fellowship hall should be no less than Family Dining at 0.67. An argument could be made that Fellowship Hall should be the same allowance as Conference/Meeting/Multipurpose, based on the usage for most congregations.
- Worship/pulpit/choir area should be no less than 1.08 w/sf. IECC does not have the exemption for Accent lighting for Pulpit and Choir found in ASHRAE. Religious sanctuaries have many features to highlight that cannot readily be covered in the base allowance plus decorative, such as tabernacle, pulpit, font, statuary, ceiling truss work, confessionals, stained glass, stations of the cross, crucifix, lectern, murals, etc.
- Add a new space type for security screening checkpoints. No comparable space type exists.
- The proposed reductions for sports arena lighting are too severe. The reductions proposed here are uniformly 35% of the allowance in IECC 2015, and lower than IECC 2018, except Class IV. Class IV is a proposed reduction of 30% and should be the same as Gymnasium Playing area.
- The lighting power allowances for transportation facilities are already among the tightest in the code. The allowances proposed here are all at least 20% reductions from IECC 2015.
- This comment pertains to the Transportation facility category. The main issue in our experience is that this category's Building Area Method (BAM) lighting power allowance appears to be based on an airport concourse, and the individual area types given in the Space-by-Space table don't address challenging areas found in rail, bus and multimodal facilities; in fact common rail/bus/multimodal transportation space types aren't acknowledged at all. Non-airport transportation facilities are often operated by authorities without the maintenance resources available to airports and in many cases without the level of finishes that can enhance perception and lighting system performance. Operating authorities that run such facilities call for lighting levels and uniformities that account for public perception, dirty surfaces, an ageing user base, and low-maintenance approaches. Each of these factors leads towards higher illuminance and uniformity requirements than acknowledged by the Stretch Code for reasons of safety/perceived security, eye adaptation and litigation protection. The solution would be to expand general lighting industry understanding that "Transportation" encompasses a wider range of building types and uses than currently acknowledged in both IECC and ASHRAE 90.1 codes and standards. In the meantime, we recommend retaining current Code values as given.
- Automotive facility: This should not include an automotive repair shop, which requires more light. Perhaps 0.70 for an auto repair facility?
- Manufacturing facility: There are OSHA requirements for the task lighting here. Someone needs to confirm that this does not conflict with OSHA's requirements.
- A small group of members of the International Association of Lighting Designers (IALD) has reviewed proposed lighting power density provisions that are under discussion for possible inclusion into the New York Stretch Code. We have limited ourselves to project types where we have extensive experience in practice, and have not commented on project types where we lack expertise. We have developed the following positions:
    - Transportation facility – in a baggage carousel area: The proposed value is too low. Use the 2018 IECC value of 0.45 w/sf.

- Transportation facility – in an airport concourse: The proposed value is too low. Use the 2018 IECC value of 0.31 w/sf.
- Transportation facility – at a terminal ticket counter: The proposed value is too low. Use the 2018 IECC value of 0.62 w/sf.
    - Airports have changed in recent years. Concourses used to be for circulation, but now they are for shopping and dining. They have become much more like mall concourses (2018 IECC =0.90 w/sf) than utilitarian transportation spaces. The energy codes have not kept up. Our group includes two lighting designers who are designing airport projects within New York City today (and one of whom is designing the new La Guardia Airport expansion). They struggle to comply with current code using best available technology, and don't see how the values proposed for NY Stretch could be achieved.
- Parking Area – Interior: The proposed value is too low. Use the 2018 IECC value of 0.14 w/sf.
    - The proposed 0.11 w/sf value is achievable using best available technology, but only under the following circumstances:
        1. Direct-only lighting solution is used (not direct-indirect or indirect-only).
        2. Daylight transition zone lighting at garage entries is excluded.
    - The first qualification is acceptable for projects in New York City. The second, unfortunately, is not an option, because the IECC does not exclude daylight zone transition lighting. The value of 0.11 w/sf was developed for Standard 189.1, which does exclude daylight transition zone lighting from the LPD calculations.
- Convention Center: The proposed value is too low. This should be 0.70 w/sf (IECC 2018 value is 0.76 w/sf).
- Convention Center – Exhibit Space: The proposed value is acceptable.
    - The proposed reduction of 50% in the whole building method allowance is just not achievable. We agree that the allowance for exhibit spaces can be reduced substantially (based on a transition from combined metal halide – halogen systems to LED-only systems), but the convention center whole building model seems to be too heavily weighted to Exhibit Spaces.
- Performing Arts Theater: The proposed value is acceptable.
- Audience Seating Area in a performing arts theater: The proposed value is too low. Use the IECC 2018 value of 2.03 w/sf.
    - Audience seating areas in performing arts theaters rely on multiple layers of lighting (downlights, step lights, cove lights, decorative fixtures, etc.) Because of this, we cannot see a reduction of more than 20% being justified in high-end theaters. However, for simpler buildings the proposed whole building value is achievable.
- Courthouse: The proposed value is acceptable.
- Courtroom: The proposed value is too low. Use the IECC 2018 value of 1.39 w/sf.
    - Courtrooms typically have multiple layers of light, including perimeter cove systems. Modern courtrooms also often require additional lighting for video cameras, and have very demanding visual tasks (i.e. reading small print).
- Sports Arena – playing area – for a Class 3 and 4 facilities: The proposed values are only achievable if an exemption is added for lighting required to meet NYS Health Code at swimming pools and spa pools.
    - New York State Health Code requires a minimum of 30 fc on the surface of the water and the wet deck. This typically translates into an average of 50+ fc. The swimming pool

also restricts the potential locations for lighting (since no one wants to service a light which is located directly over a swimming pool), which makes layouts even less efficient. We propose the following:

- C405.3.1 (exemptions):
  20. Lighting required to satisfy New York State Health Code requirements at swimming pools and spa pools (both underwater lighting and lighting on the surface of the water) so long as the area of the pool and the pool wet deck is excluded from the lighting power allowance calculation.

- Library: The proposed value is too low. Use the IECC 2018 value of 0.78 w/sf.
- Library – in a reading area: The proposed value is acceptable.
- Library – stacks: The proposed value is too low. Use the IECC 2018 value of 1.20 w/sf.
  - A number of us have lighted libraries, and no one believes that IES recommended light levels can be achieved in stack areas with only 1.08 w/sf.
- Religious Building: The proposed value is too low. We recommend a value of 0.90 w/sf (IECC 2018 value is 0.94 w/sf).
- Audience Seating Area – religious building: The proposed value is too low. We recommend a value of 1.30 w/sf (IECC 2018 value is 1.53 w/sf).
- Religious Building – fellowship hall: The proposed value is too low. Use the IECC 2018 value of 0.55 w/sf.
- Religious Building – worship / pulpit / choir area: The proposed value is too low. Use the IECC 2018 value of 1.53 w/sf.
  - The reduction of Religious Facilities overall to 0.70 w/sf is likely to be problematic for facilities where sanctuaries, lobbies, etc are the largest spaces in the building. As sanctuaries tend to have high ceilings, indirect lighting, etc., they require higher LPDs. Unless there are a lot of offices, classrooms, etc, to offset the sanctuary and other specialty spaces, 0.7 w/sf is going to be difficult to meet. Religious facilities are probably not that commonly designed/renovated in NYC to target serious savings on this building type.
  - At the space by space level,
    1. Audience Seating Area in a religious building – the IES has different recommendations for light levels depending on the type of worship, but the audience seating area can be as high as 30fc for the 25-65yr old group. Given the statistics on most religious service attendees today, the >65yr old recommendations need to be considered and can be as high as 60fc for the seating area. With the high architectural requirements, we recommend a reduction of no more than 15% to 1.30 w/sf.
    2. Religious Buildings – in a Fellowship Hall – Isn't this the main non-worship gathering space ("social hall")? Limiting the LPD to 0.42 W/sf is going to reduce this space to troffers. At many facilities, this space is used for events where the space should look nice. The 2018 IECC value is the lowest we recommend. Even that does not offer a lot of flexibility in terms of coves, etc.
    3. Religious Buildings - in a worship/pulpit/choir area – See comments above for Audience Seating Area.

- Atrium – Less than 40 feet in height: The proposed value is too low. Use the IECC 2018 value of 0.03 w/sf per foot in total height.
- Atrium – Greater than 40 feet in height: The proposed value is too low. Use the IECC 2018 value of 0.40 w/sf + 0.02 w/sf per foot in total height.
    - The code has not recognized the difficulty in lighting multi-story atrium spaces. We believe that values in the current code are insufficient.
- Lobby – otherwise: The proposed value is too low. Use the IECC 2018 value of 1.0 w/sf.
- Lobby – in a facility for the visually impaired: The proposed value is too low. Use the IECC 2018 value of 2.03 w/sf.
    - We oppose any reduction in LPD for base building lobbies. The allowance for these spaces is already too low because the IES does not acknowledge the need for eye adaptation for pedestrians entering lobbies from outside, and the corresponding higher light levels that are required during the day. With the best equipment and the decorative lighting allowance this is still always a struggle. The allowance actually increased from the 2015 to the 2018 IECC, and this was because the 90.1 Lighting Subcommittee ignored the 10 fc recommendation of the IES, and increased this to 20 fc. 40 fc is the standard for most lobbies in midtown Manhattan.
    - Spaces for the visually impaired require twice as much light as spaces for normally sighted people, and therefore require twice the wattage allowance.
    - The proposed value in NY Stretch for “lobby – otherwise” would be acceptable if a new category were created for “lobby –building entry” with the higher values noted above.
- Exercise Center: The proposed value is too low. Use the IECC 2018 value of 0.65 w/sf.
- Gymnasium / fitness center – in a playing area: The proposed value is too low. Use the IECC 2018 value of 0.82 w/sf.
    - We have never gone much under code in exercise centers. This is especially true for high end clubs that utilize many layers of light and schools that use these spaces for other purposes.
- Laboratory – otherwise: The proposed value is too low. Use the IECC 2018 value of 1.45 w/sf.
    - The proposed 1.24 w/sf value is achievable using best available technology, but only under the following circumstances:
        1. The space is designed for IES recommended 75 fc; or
        2. Task lights are provided at benches.
    - Many laboratory owners / operators refuse to include task lights at the benches because of practical issues (cleaning, coordination with furniture systems, and conflicts with equipment). Many laboratory owners / operators, particularly larger institutions with great experience in operating lab spaces, require 100 fc in their lab spaces. This is detail-oriented work where mistakes can be dangerous and expensive, and it is not right for us to second-guess them.
- Classroom / lecture hall / training room – otherwise: The proposed value is acceptable.
- Corridor – otherwise: The proposed value is acceptable, but not for school corridors.
    - Oftentimes corridors see extra activities and areas in the program including study areas/nooks. Many schools use corridors as active pinup spaces for review and discussion. Our major concern is with circulation space that (should) contain

displays of student work. Typically this is paper-based and at least in NYC corridors receive little if any daylight. What we really need is a way to put more light into a corridor to highlight student work and circulation as one ambient solution. "Corridors are my biggest challenge when lighting schools." – Jim Conti

- In order for the corridor and classroom values to be reduced as proposed in NY Stretch, we believe that a new category must be created for school corridors, with LPD equal to that in classrooms. This would be: C405.3.2(2) Corridor – in a School – 0.74 w/sf

- Office – enclosed: The proposed value is acceptable.
- Office – open plan: The proposed value is acceptable.
- Restroom – otherwise: The proposed value is acceptable.
- Computer Room: The proposed value is acceptable.

Action or Other Shown in Final Draft

- Changed Convention Center LPD to 0.70 per recommendation.
- Changed Exercise Center LPD to 0.65 per recommendation.
- Changed Religious building LPD to 0.72 to match Townhall LPD based on similarities in use types.
- Changed Atriums >40 feet in height to 0.40 + 0.02 per foot in total in response to lack of available LED packages for larger volume spaces.
- Created a new category "In a primary or secondary school (and not use primarily by the staff)" with an LPD of 0.74 per recommendation.
- Reduce LPD for Courtroom to 1.06 to match heavily used areas in penitentiaries where there is a similar need for higher light levels for the use of video cameras.
- Changed Laboratory LPD to 1.32 based on the task lighting being set to 50% of the space (which for this part of the space would be 48 + 50 fc = 98 fc) then the total LPD would be 1.32 W/sf.
- Changed Lobby in a facility for the visually impaired to 2.03 as there may not be an LED light packages that can serve these areas to meet the light levels required. Changed Lobby Otherwise LPD to 0.9 which was the value used in the 2015 IECC.
- Added exception for daylight transition zones and ramps without parking from 90.1 as footnote "i" in table.
- Changed Library – In the stacks LPD to 1.20 based on recommendation as the 2015 IECC value was already significantly reduced.
- Changed Religious buildings – in fellowship hall LPD to 0.54 to match family dining per recommendation.
- Added exception for pool surfaces as footnote "j" in table.
- Changed Transportation facility – in an airport concourse LPD to 0.31 per recommendation as these spaces have more retail and assembly uses.

NYStretch-2018 Code Section: Amendments to Table C405.4.2(2) (Lighting power allowances for building exteriors).

Reference ID # for Comments received on Tables C405.4.2(2):

cfbd4952

Comment Text Received on Tables C405.3.2(1) and C405.3.2(2):

- The exterior LPAs for Parking areas and drives is too low. ASHRAE was challenged on the LPA based on the latest IES recommendations for concrete parking areas. These include roof top of parking structures. AGI calculations were done to achieve the 1.o fc minimum, which could not be achieved at 0.03 w/sf, and barely achievable at 0.04 w/sf using all LED technology in 2017. The 0.05 LPS for Zone 4 will create too great a contrast for other exterior areas in Zone 4, without any flexibility to provide much higher than minimum recommended light levels.
- The allowances for exterior dining should be comparable to interior dining. No reductions were proposed from IECC 2015 to 2018 or stretch code. The allowances here are in line with those proposed for interior dining areas.

Action or Other Shown in Final Draft
• Changed Parking area and drives in Zones 1 and 2 to 0.04 per recommendation.

NYStretch-2018 Code Section: Addition of new Section C405.8.1.1 (Power conversion system)

Reference ID # for Comments received on Section C405.8.1.1:

d2d0abb4
d2ec5f2d

Comment Text Received on Section C405.8.1.1:

- This section will be shown to the NYC Elevator Committee on April 10, 2018 for input.
- I am not opposed to this addition in principal. However, there are not exceptions for smaller systems. My understanding is that this is a more difficult energy saving strategy for projects with short lift heights, and runtimes. Recommendation: Make the requirement applicable to buildings that exceed a certain number of stories or building height (e.g., 5 stories or 75 ft in height). I have not technical basis for this limit, just past experience where project elect to do this versus not.
- This code has not been reviewed with the NYC DOB Elevator and Escalator Code Committee for coordination with the NYC Elevator and Escalator Code.
- What would be the effective trigger for enforcement of the code if ratified, such as building permit for new construction?
- Where there is an existing elevator shaft, referenced requirement C 405.8.1.1.3 can have significant impact on other existing building systems including electrical substations, wiring, transformers, etc. It is also unclear if this requirement applies also to elevator alterations that involve only new elevator power conversion system apparatus to existing elevators in existing elevator shafts.
- The proposed requirement effectively outlaws many necessary geared machine applications such as those used on freight elevators. These are very limited elevator applications in building and will have negligible impact on overall building energy efficiency.

Action or Other Shown in Final Draft
• Modified text to remove “existing elevator shafts” and included new text specifying elevators with capacities below 4,000 lbs. • Modified text to apply only to new traction elevators with a rise of 75 feet or more.

NYStretch-2018 Code Section: Addition of new Section C405.10 (Automatic receptacle controls).

Reference ID # for Comments received on Section C405.10:

bc8a8e5b
d1378db8
d18b2a79
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C405.10:

- C405.10 automatic receptacle controls requiring 50% of electrical outlets to be on a timer has been vocally opposed by the NFPA due to the requirement forcing users to overload non controlled outlets resulting in undue risk of electrical fires.
- Reviewer is concerned that this section of the code has encouraged designers to "game the system" in order to arrive at code compliance (i.e., doubling the number of space-required receptacles to avoid switching certain receptacles). Suggest adding more robust requirements in order to meet the intent of this section.
- The proposed language comes from ASHRAE, but we are reluctant to adopt this in NYC. First, there are two studies regularly cited to provide evidence that this strategy will result in energy savings. The first is a study that cannot be considered unbiased, as it was conducted at a US Department of Energy NREL office. The second is a study funded by the Minnesota Department of Commerce. In the study for MN, automatic receptacle controls were not a strategy that was studied in isolation. This has considerable cost and is easily avoided in use by the occupant. The equipment that is being plugged in is increasingly being made more efficient by technology and software management that greatly reduces the effectiveness and need for a controlled receptacle. We do not recommend including this provision, unless more conclusive data can show that it is cost effective and truly impacts energy savings.
- This amendment is almost universally considered expensive, inconvenient, and with limited, if any, further benefit, as auxiliary equipment already shuts down automatically. If not eradicated, then before implemented, the practical implications of the automatic receptacle controls must be investigated and explained better. Installation of these devices also has the unintended consequence of causing a massive demand spike following installation, which is a consequential consideration. There is concern that this section encourages gaming (i.e., doubling the number of space-required receptacles to avoid switching certain receptacles).

Action or Other Shown in Final Draft
• Measure moved to Appendix CC

NYStretch-2018 Code Section: Addition of new Section C405.11 (Commercial Kitchen Equipment)

Reference ID # for Comments received on Section C405.11:

d18b2a79
d2ec5f2d
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C405.11:

- The language in this section is unenforceable for several reasons:
    - "…equipment within the scope of the applicable Energy Star program…" is vague and does not point to a specific version or section of the Energy Star program.
    - "…shall comply with the equivalent criteria required to achieve the Energy Star label…" is vague and does not point to any metric. Without this, there is no actionable metric to enforce.
    - "…if installed prior to the issuance of the Certificate of Occupancy." gives every building an out.

  Suggestion:

    1. Remove this entire section; OR
    2. List the applicable metrics for the listed equipment AND delete the text "if installed prior to the issuance of the Certificate of Occupancy", IF this is confirmed to not be a Federal preemption issue.
- It's unclear why this should depend on when the equipment is installed. The equipment should either meet the requirement when designed and installed or it shouldn't. Compliance would only require that the equipment specified as being required to be energy star and the equipment submittals should support this. Recommendation for text: "The following equipment shall be Energy Star labeled".

Action or Other Shown in Final Draft
• This equipment was specifically selected due to the fact that it is not regulated by Federal Preemption. • Added Tables with minimum efficiency requirements and testing procedures instead of Energy Star reference. • Removed "Certificate of Occupancy" stipulation.

NYStretch-2018 Code Section: Addition of new Section C405.12 (Electric vehicle charging station capable)

Reference ID # for Comments received on Section C405.12:

cfbd4952
d2ec5f2d
d32357d9
d3253c78
d34e16dd

Comment Text Received on Section C405.12:

- Insert phrase, "with 10 or more parking spaces" in charging language.

- These will increase not reduce building energy use. While laudable it doesn't belong in an energy code, but should be part of other municipal planning efforts. Propose removing.
- This amendment may work against the utility's demand response program goals (especially Con Edison in NYC) and lead to larger spikes in demand charges if electric vehicles are plugged in during hot summer days.
- Electric Vehicle Charging stations – I think we can / should do more here for option 2 – increase to 20% for new buildings?

Action or Other Shown in Final Draft
• Clarified language and added 10 parking space threshold per recommendation. • Changed order of requirement.

NYStretch-2018 Code Section: Addition of new Section C405.13 (Solar-ready zone)

Reference ID # for Comments received on Section C405.13:

d1378db8
d2ec5f2d
d32357d9
d3253c78

Comment Text Received on Section C405.13:

- Suggest clarifying this code language to be consistent when referring to alternate compliance paths as outlined in C402.1 Application. The Application Section does not refer to an Appendix CA but rather to the Prescriptive compliance path of ASHRAE, Performance compliance paths of ASHRAE and the Prescriptive compliance path of the 2018 International Energy Conservation Code as amended by New York State.
- Projects would be required to set aside space and provide additional design allowances for loads, and electric pathways, or document that they meet exceptions that allow them not to do so. In either case the requirement doesn't actually yield any energy savings. Nor would it preclude a building owner in the future from using this space for anything (or nothing). Propose removing.

Action or Other Shown in Final Draft
• This section is a requirement that references a published appendix in the 2018 IECC and applies to projects complying with the prescriptive compliance path and should not be classified as an alternative compliance path. • No changes made.

NYStretch-2018 Code Section: Addition of Section C405.14 (Whole building energy monitoring)

Reference ID # for Comments received on Section C405.14:

bc8a8e5b
d1378db8
d18b2a79
d32357d9
d3253c78
d32599f0
d34e16dd

Comment Text Received on Section C405.14:

- C405.14 Whole building energy monitoring of electricity has been a valuable tool for building owners where the utility does the normal monitoring using 15 minute billing intervals. This is not practical or even possible with other fuels and is of little value on a 15 minute interval such as fuel oil which is only consumed during winter heating months. The present EPA Energy Star annual accounting system is a value tool and needs no further labor intensive and safety measures.
- Recommend striking the word 'not' from "…plant that is not within the building." Recommend modifying "to monitor energy use of the following types of energy…" to read "…to individually monitor energy use of each of the following types of energy…"
- A fourth exception should be added for the circumstance when utility meters are not capable of providing required outputs and local regulations prohibit submetering as for example exists with natural gas.
- Tenant spaces that are served by central mechanical systems should be sub-metered for their thermal energy usage. This is a low incremental cost addition, and closes a loophole on behavior that currently exists.

Action or Other Shown in Final Draft
• Did not modify text to remove "not" as the intent of this measure is to monitor energy use that is coming from outside the building. Incorporated additional edits to clarify individual fuel monitoring. • Added new Section C405.15 Whole Building Electrical Monitoring to better clarify what the monitoring requirements are for electricity.

NYStretch-2018 Code Section: Section C406.1 (Requirements) – Section C406.7 (Reduced energy use in service water heating)

Reference ID # for Comments received on Section C405.14:

b3f52b82
bc8a8e5b
e570c543
cfbd4952
d1378db8
d1805457
d18b2a79
d198c5e0
d2ec5f2d
d32357d9
d3253c78
d32599f0
d341c937
d34e16dd

Comment Text Received on Section C406.1 – C406.7:

- Delete Option 2, reduced lighting power allowance. This is already a stretch code that is relying on significantly reduced lighting power allowances as the base requirement. It is an unreasonable burden to suggest that the LPA can be further reduced as an efficiency option, but clients are likely to think that will be an inexpensive choice. Need to renumber options 3-6. Also need to eliminate C406.3 and renumber the remaining options.
- Tables C406.2(X) are already "stretch" requirements in ASHRAE 90.1 and ASHRAE 189.1 and further demands by this amendment will find products that cannot be manufactured yet.
- Some of the C406.2(X) tables appear to be less efficient than the requirements of ASHRAE 90.1-2016.
- Table C406.2(8) (Minimum efficiency requirements: Gas and oil-fired boilers). Recommend changing note A units to BTUh for consistency 85% efficient gas fired hot water should be allowed when used in retrofit applications where terminal devices are designed for 180F and the boiler room is in the basements and the chimney is > 50feet. The high supply temperature will prevent flue gases from condensing and limiting the overall efficiency < 87%. Venting CAT IV/II appliances becomes difficult with tall chimneys and expensive.
- Footnote f requires that hot water heating systems be designed to ensure condensing occurs. This is a good thing. Can it be required in the mandatory section (C403.3.2), and not just as one of several options in C406.1?
- Provide a definition of the acronym UA in Section C406.6.
- The amendment requires that "the total UA of the building thermal envelope as designed shall be not less than 15 percent below the total UA of the building thermal envelope". I propose to offer an alternate path, where all the energy use of the envelope is considered: "Alternately, the total energy use of the building thermal envelope as designed shall be not less than 15 percent below the total energy use of a thermal envelope that complies with the Energy Code, using energy modeling as required per the Energy Code". This is because cooling load is a much greater component than heating load in many building types, including office buildings. For office building, a reduction in heating load can be much less significant than a reduction in cooling load. The provision would also offer flexibility in achieving energy use reductions due to the envelope.

- In this section about DOAS systems, there is a sentence "The ventilation system shall be capable of energy recovery." The base 2018 IECC language (in C406.6) says "total energy recovery." What level of recovery performance is required?

Action or Other Shown in Final Draft
• Removed Tables C406.2(X) and will instead reference the requirements for C406.2 in IECC 2018 which is a 10% improvement over the base code efficiency tables. Because this is one alternative, projects can select one of the other C406 packages in cases of limited mechanical equipment availability. • The note regarding footnote f is a base code issue. • A definition for UA is provided in section C402.1.5 which is cited. • The use of "total energy recovery" in the 2018 IECC is a mistake that is corrected here. It is understood that this is a term used by mechanical engineers and the corrected wording still allows them to use systems with this functionality. • Reworded Section C406.6 Enhanced Envelope Performance for clarity. • Added exception to C406.7 Reduced Air Infiltration for building greater than 250,000 square feet allowing for representative air leakage testing.

NYStretch-2018 Code Section: Amendments to Section C407.1 (Scope).[2]

Action or Other Shown in Final Draft
• Added section to clarify Section 11 and Appendix G compliance paths.

NYStretch-2018 Code Section: Amendments to Section C408.2 (Mechanical, renewable energy, and service water heating systems commissioning and completion requirements).

Reference ID # for Comments received on Section C408.2:

d1378db8
d32599f0
d34e16dd

Comment Text Received on Section C408.2:

- Recommend revising Condition One to state "The building is greater than 25,000 square feet (2,325 m2)." Recommend clarifying whether the mechanical equipment referenced in Condition Two includes variable air volume boxes (VAV's), fan-powered boxes (FPB's), local air conditioning units, etc. Recommend revising Condition Three to state "The combined service water-heating and space-heating equipment capacity being installed is greater than 600,000 Btu/h…" Recommend revising System Seven to be revised to state "Renewable energy and energy storage systems where installed generating capacity is greater than or equal to 25 kW."
- Suggest keeping the language as it was in the previous draft of the Stretch code. By listing the three requirements up front in numbered format, renewable energy systems > 25kW are not required to do commissioning on buildings less than 25,000 sf.
- Item 3 has a drafting error, the phrase "combined service water-heating and space-heating capacity" is listed twice in the sentence.

[2] Section not included in draft published for Public Review

- Suggest requiring commissioning certification and/or commissioning project experience rather than solely the design professional requirement.

Action or Other Shown in Final Draft
• Removed second "combined service water heating and space heating capacity" from #3. • Clarified scope for mechanical systems.

NYStretch-2018 Code Section: Amendments to Section C408.2.2 (Systems adjusting and balancing).

Reference ID # for Comments received on Section C408.2.2:

d34e16dd

Comment Text Received on Section C408.2.2:

- This air systems balancing requirement is for supply systems only. Exhaust systems be balanced as well; however, they may need a lower fan motor hp cutoff to avoid the exclusion.
- Fans with fan motors less than 1hp are already required to be provided with a means for balancing in the ECM section. There is no need to confuse things by having an exemption hear. In fact, this should indicate that all fans 1hp and less shall be balanced at the fan motor. In addition, this exception can cause confusion - does that mean that air outlets or zone terminal devices after a fan 1hp or less do not need a means for balancing?
- Similar confusion for pumps 5 hp or less – does this mean downstream coils do not need to be balanced or have a means for balancing? Also measuring flow across small pumps (<5 hp) can be crucial for ensuring (for example) proper boiler water flor rates or DHW recirculation flow. This exception is not recommended.
- Per previous iterations of the code. The exception for unitary or packaged equipment should be removed or qualified (i.e. it only applies to item 4)
- Add at the end "and the controls requirements outlined in this code"

Action or Other Shown in Final Draft
• No changes made as language is from 2018 IECC.

NYStretch-2018 Code Section: Addition of new Section C408.4 (Air barrier commissioning)

Reference ID # for Comments received on Section C408.4:

e570c543
d19b1034
d2ec5f2d
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C408.4:

- This is a NYC specific comment. Current NYC Energy Code Progress Inspections includes Air sealing (IIA6) and Air Sealing Testing (IIA7). Therefore the responsibility should be with the inspection agency, not the registered design professional.

- This is a NYC specific comment. Air barrier continuity plan is already a part of the NYCECC 2016 requirements and is required for DOB review.
- Remove: Air barrier continuity shall be determined by testing or inspecting each type of unique air barrier joint or seam in the building envelope for continuity and defects.
- Add: Air barrier compliance shall be inspected on samples on min 15% of the locations for each transition from one construction type to another.
- The code fails to address whether other building systems including structural and envelope are required to be commissioned. Building Enclosure Commissioning (BECx) is being more widely used in the industry per LEED v4.0 but BECx is not specifically identified by code. Some of the provisions in the stretch code including proposed air barrier commissioning are called out in proposed provisions.
- Suggest Modify Proposed Provision C408.4.2. – Air Barrier continuity shall be determined by testing or inspecting each type of unique typical air barrier joint or seam in the building envelope for continuity and defects. IN CONJUNCTION WITH Adding to proposed provision C408.4.1 the following sentence: "Each typical air barrier of joint and seams shall be identified in the construction documents." 'Each type of unique' joint or seam is vague and over-reaching what is practical on large construction projects. There can be literally linear miles or hundreds of such joints on a project and the expectation set in the proposed provision by using word 'each' is same as every joint shall be inspected. This is an over-reach and would require an army of inspectors to be looking over the shoulder of installers as the work progresses. Finally, the typical joints and seams need to be established on the construction documents by the design professional, not the inspection agency.
- The Joint Organizations recommend removing the two references to code officials in the rule in the interest of avoiding unnecessary administrative inefficiency. The function of the code official is enforcement of the code. It is not the function of the code official to implement the code in the code official's discretion. Such an interpretation is contrary to the purpose for having a code.

Action or Other Shown in Final Draft
• Added "approved agent" to C408.4. and added references for clarity.

NYStretch-2018 Code Section: Addition of new Section C409 (Additional power distribution system packages)

Reference ID # for Comments received on Section C409:

b3f52b82
d18b2a79
d2ec5f2d
d30734d1
d3187eae
d318e78a
d32357d9
d3253c78
d32599f0
d334a91b

Comment Text Received on Section C409:

- Nothing required in this new section has been proven to save energy, and are a combination of unworkable or extraordinarily expensive measures. The way the section is written requires a building owner to choose the least expensive option, as they are being backed into a corner of spending money on items which do not impact energy performance. Specifically, the energy monitoring provisions are nearly impossible to implement in core & shell office construction, as bulk power is provided to tenant spaces, and the panels that segregate lighting and small power are typically not provided at the time of base building construction. There is no evidence that gathering of energy data at the level of granularity required in this section results in energy savings. There is also no evidence that making a building ready for Automatic demand response achieves any energy savings. Building owners should be free to choose whether the wish to participate in demand response programs, and such participation is usually achieved manually. It is recommended that the entire section be deleted due to excessive expense and no measurable energy savings.
- While laudable goals, nothing here really saves any energy other than the renewable energy requirements. However, the threshold for renewable energy is too high to make this practicable for many if not most projects. This is further complicated by the fact that when an energy model is run the savings are limited under ASHRAE 90.1 for renewable energy savings. Proposed change: Strike this section in its entirety.
- The Joint Organizations recommend adding a sixth category of compliance, namely, the purchase of national renewable energy credits.

Action or Other Shown in Final Draft
• Made entire Section C409 non-mandatory by moving to appendix.

NYStretch-2018 Code Section: C409.2 On-site renewable energy.

Reference ID # for Comments received on Section C409.2:

d30734d1

Comment Text Received on Section C409.2:

- Looks like it's just one of several options for compliance, but not easy in NYC. A 10-story building *without setbacks* would need 5 W/sf of gross roof area, so around 25% coverage of the gross roof area with PV. That's hard to achieve. A 40 story building with *no setbacks* would have rooftop 100% covered. Further, roofs (as well as facades) have limited solar exposure. It would in many cases be cost ineffective. The code should rather place limits on the requirement according to how much solar aperture the building has. In fact, ideal in an urban environment would be that the code is phrased to support microgrid development, i.e. both the development and harvesting of a solar resource is shared by a large group of buildings, regardless of on whose property the resource falls.

Action or Other Shown in Final Draft
• Made entire Section C409 non-mandatory by moving to appendix.

NYStretch-2018 Code Section: C409.3 Electrical energy monitoring

Reference ID # for Comments received on Section C409.3:

Reference ID
b3f52b82
d2ec5f2d
d3187eae
d318e78a
d32357d9
d3253c78
d32599f0
d334a91b

Comment Text Received on Section C409.3:

- We propose Section C409.3 (Electrical energy monitoring) be a mandatory requirement rather than part of an optional code path.
- While under ASHRAE there are limits on these requirements for building size (e.g., greater than 25,000 sf) and type of occupancy (e.g., dwelling units) there are no limits here. Additionally the language is inconsistent between sections and would a more careful read and edit before being enforceable. Also the meters, data acquisition and reporting would require relatively complex systems. Thus this option would be limited to very particular buildings and thus not a practical requirement for most. Proposed change: Delete this requirement or revise the language to be equal to ASHRAE's.
- Separate energy use category into HVAC systems and a separate category for hot water.
- The Joint Organizations have one recommended change to this amendment, namely, to remove the requirement to distinguish the Interior lighting load category from the receptacle circuits load category because of the high cost and complexity of distinguishing these two categories, which often share locations on panels. Doing so makes this amendment more feasible, with only a limited impact in the non-segregation of these two categories.

Action or Other Shown in Final Draft
• Made entire Section C409 non-mandatory by moving to appendix CC.

NYStretch-2018 Code Section: C409.4 Interoperable automated demand-response (AutoDR) infrastructure.

Reference ID # for Comments received on Section C409.4:

b3f52b82
d32357d9
d3253c78
d32599f0

Comment Text Received on Section C409.4:

- Section C409.4 (Automated demand response) is not consistent with the energy use reduction goals of the code since it about resiliency and not energy reduction. We recommend that it not be included.
- The Joint Organizations recommend that this amendment be removed unless extensive review confirms that it is significantly coincides and complies with Con Edison's standards and requirements.

Action or Other Shown in Final Draft
• Made entire Section C409 non-mandatory by moving to appendix CC.

NYStretch-2018 Code Section: C409.6 (Community Solar).

Reference ID # for Comments received on Section C409.6:

d32599f0

Comment Text Received on Section C409.4:

- This section is unenforceable as Building Departments do not review or monitor contracts.

Action or Other Shown in Final Draft
• Deleted section.

NYStretch-2018 Code Section: Addition of new Section C502.2.3.1 (Commissioning)

Reference ID # for Comments received on Section C502.2.3.1:

Reference ID
d32599f0

Comment Text Received on Section C502.2.3.1:

- This section needs to be added to Section C502 Additions. Commissioning was added to alterations, but not additions.

Action or Other Shown in Final Draft
• Is now included as additions and alteration measure.

NYStretch-2018 Code Section: Addition of new Section C502.2.4.1 (Commissioning)

Reference ID # for Comments received on Section C502.2.4.1:

d32599f0

Comment Text Received on Section C502.2.4.1:

- This section needs to be added to Section C502 Additions. Commissioning was added to alterations, but not additions.

Action or Other Shown in Final Draft
• Is now included as additions and alteration measure.

NYStretch-2018 Code Section: Addition of new Section C503.4.2 (Commissioning).

Reference ID # for Comments received on Section C503.4.2:

d32599f0
d34e16dd

Comment Text Received on Section C503.4.2:

- Dwelling units are not exempt from the commissioning requirements in Section C408. Suggest deleting Exception #2 in this section to eliminate conflict between Section C408 and Section C503.
- Why not include lighting, refrigeration and renewables as well?

Action or Other Shown in Final Draft
• Dwelling unit exemption removed – also consistent with NYStretch Section C408

Part 2: Amendments to ASHRAE 90.1-2016

NYStretch-2018 Code Section: Part 2: Amendments to ASHRAE 90.1-2016

Reference ID # for Comments received on Part 2:

b1f96578
b3f52b82
bc8a8e5b
e570c543
ec50cee2
d2ec5f2d
d2ec6a50
d30901d2
d32357d9
d3253c78
d32599f0
d32699d0
d34e16dd

Comment Text Received on Part 2: Text of public comments available upon request to NYSERDA.

Action or Other Shown in Final Draft
• In response to comments, Part 2 was substantially redrafted and revised in consultation with modeling consultants and other reviewers. Final Draft contains details of review and revision process.

PART 3: Amendments to 2018 Energy Conservation Construction Code Residential Provisions

NYStretch-2018 Code Section: R401.2 Compliance

Reference ID # for Comments received on Section R401.2:

Reference ID
d32599f0

Comment Text Received on Section R401.2:

- Projects that plan to comply using Section R408 still must meet the mandatory provisions of the code. It will be important to convey that the State may not accept PHI or PHIUS software as acceptable for proving compliance with the base code. At this time, they have only said that it would be acceptable for proving compliance with the Stretch Code requirements, meaning that projects would have to prove compliance with the base code separately.
- The language is not clear to whether townhouses and semi-detached homes are allowed to follow this compliance path. If the intent is to only allow multi-family buildings to use this path, then instead of stating "for projects other than detached one and two-family dwellings," use the language "for multi-family projects".

Action or Other Shown in Final Draft
• Modified #4 to: *Group* R-2*, Group* R-3 *and Group* R-4 *buildings* • Included PHI/PHIUS as they are being used to meet compliance with the Stretch Code and not for State Code compliance therefore it is not an issue.

NYStretch-2018 Code Section: Amendments to Table R402.1.2 (Insulation and fenestration requirements by component)

Reference ID # for Comments received on Section R402.1.2:

Reference ID
e3aec566
d2f9247a
d3187eae
d318e78a
d32599f0
d334a91b

Comment Text Received on Section R402.1.2:

- We cannot express sufficiently how critical it is to have the prescriptive path maintained in the code. This is the most common compliance path for residential construction in NYC. If we want applicants and builders to achieve the intent of the code, we must make it easy for them to follow it. In the column labeled "Wood Frame Wall R-Value", footnote "c" is introduced to mandate "Intermediate Framing." There is no reference standard provided to describe "intermediate framing," and this lack of clarity will require a major effort to convey to builders how to comply. This is also going to create confusion since "Int" is later used in the table under the column labeled "Basement Wall R-value". It is unclear if this is meant to relate to the framing of interior walls intersecting with the basement wall or something else,

as footnote “f” does not address it. The intention of these requirements is going to be widely misunderstood without clearer direction. NYSERDA or the State will need to support this concept of “intermediate framing” with sufficient resources and training (for reference, the State of Washington has a 26 page guide to describe their framing requirements- who is going to prepare this for NY?). Why is “intermediate framing” required in CZs 4 and 5, but not required in CZ6? Why can’t the table reflect R-value requirements for standard framing? Also, this approach with mandated “intermediate framing” eliminated the requirement for minimum continuous insulation on the exterior. Isn’t that still important? Should “intermediate framing” requirements also apply if an applicant chooses to use Table R402.1.4? In the column labeled “Mass Wall R-value”, footnote “e” indicates that the second R-value applies when over half of the insulation is on the interior of the wall. As the insulation requirement is 21/21 for all CZs, there seems to be no point to this footnote, since the requirement is the same on BOTH sides of the wall. Why is there no difference between the two levels of insulation? With no difference, why would any applicant choose to put insulation on the exterior of the wall? In the column labeled “Basement Wall R-Value”, footnote “f” ignores that each cell of the table also includes the abbreviation “int.” Is “int” still referencing footnote “c” or is it intended to mean something else here? If it is intended to mean “Intermediate framing” then it should be addressed in footnote “f” also, so that it is absolutely clear what the applicant must do. There is no minimum performance for the “TB” thermal break. As such, applicants are likely to use the least effective thermal break that they think they can get away with. In the column labeled “Crawl Space Wall R-Value”, footnote “f” is referenced. However, footnote “f” describes a thermal break between the wall and a slab. Crawl spaces do not always have a slab, so the note needs to be modified appropriately to address where a thermal break is required in relation to a crawl space wall. Are you mandating that all crawl-spaces have a slab? Footnote “b” is better addressed in Section R402.2.2, Ceilings without attic spaces. Define both “single rafter” and “joist-vaulted” ceilings. Address appropriately in R402.2.2, so that these areas of reduced insulation are limited to a maximum portion of the roof. Should there be mention of raised heel framing? Like the “intermediate framing” comments, this will require considerable outreach to designers and home builders. Do not eliminate the note “For SI: 1 foot = 304.8 mm.

- Remove SHGC requirements for south facing glazed fenestration in climate zone 4.
- The proposed changes to Table R402.1.2 present two significant steps backward and risk reducing the flexibility, ease of use, adoption, and cost effectiveness of the code. First, the proposal deletes the existing continuous insulation requirements in climate zones 4 and 5. Deleting the continuous insulation provision is a step backward that reduces compliance options, cuts the competitive options in the market place and drives up costs. A 13+5 option should be included in CZ 4 and 5 to allow use of continuous insulation. This would be an improvement on R-20 and is thermally equivalent to an R21 wall. Further, adding a continuous insulation option does not preclude other equivalent solutions, it rather enhances the ease-of-use and achievability of the code and keeps it in line with the IECC. Adding a 13+5 option for CZ 4 and 5 is also consistent with footnote ‘f’ in Table R402.1.2 for basement walls where R21 cavity insulation on the interior side of the basement wall is permitted to be met with R13+5 insulation on the interior side of the basement wall. Second, increasing the minimum wall cavity insulation R-value in the Stretch Code to R21 in climate zones 4 and 5 would have the perverse effect of eliminating the use of valuable insulation materials such as open cell spray polyurethane foam (ocSPF) in New York. The unique attributes of ocSPF allow builders to install insulation and an air barrier, as well as seal a house with one product, providing additional benefits to the thermal envelope beyond just insulation. In a 2x6 wall, ocSPF can achieve an R-20 within the limits of the cavity depth. The change to R-21 would entirely eliminate this category of products, reducing flexibility and driving up costs.

- Continuous Insulation of increasing R value = increasing thickness, which starts to become a life safety hazard. There is no known insulation which can achieve this level of R-value in a manageable thickness. At R 15.6, approximately 3" of rigid foam insulation is required, and at R-19.5ci, approximately 4" of rigid foam. The same in mineral wool would require approximately 3.5" and 5" respectively. This has the effect of extending the depth of the wall panel anchors / brick ties / anchor clips, beyond the depth of their typical use and testing. These requirements are pushing the limits of present day construction technology, in an unsafe manner, because there is no time allowed for design and testing, the code is being enforced immediately. The right approach is to advise the profession and the trades people / manufacturers of the more demanding requirements and allow everyone to alter the details to achieve the required depths. Note also that the R-value of foam insulation diminishes over time, so the R-value achieved at time of design / construction, will not be maintained throughout the life of the Building, and that also applies for most weather seals, and breaks. All products deteriorate, but the weather seals can be replaced, the breaks and insulation, not so easily.

Action or Other Shown in Final Draft
• Modified R-values for Wood Frame Walls for Climate Zones 4 and 5 to match requirements in 2016 NYCECC and allowed both IECC and intermediate framing. • Modified R-values for Mass Wall for Climate Zones 4, 5 and 6 to match requirements in 2016 NYCECC. • Modified R-values for Basement Walls to match requirements in 2016 NYCECC • Modified R-values for Slabs to match requirements in 2016 NYCECC. • Modified R-values for Crawl Space Walls to match requirements in 2016 NYCECC

NYStretch-2018 Code Section: Amendments to Table R402.1.4 (Equivalent U-factors)

Reference ID # for Comments received on Section R402.1.4:

d3187eae
d32599f0

Comment Text Received on Section R402.1.2:

- In the column labeled "Frame Wall U-factor", the proposed value for CZ 4 is 0.056. The current allowable value in the 2016 NYCECC is 0.045. Was this change evaluated?
- The Residential Code should require that the building envelope meet the Zone 6 requirements, and this should be reflected in Tables R402.1.2, R402.1.4, and R402.1.5, as per the 2016 NYC amendments to the IECC.

Action or Other Shown in Final Draft
• Modified U-factors for Frame Walls in Climate Zones 4 and 5 to match requirements in 2016 NYCECC.

NYStretch-2018 Code Section: Delete Section R402.2.2 (Ceilings without attic spaces).

Reference ID # for Comments received on Section R402.2.2:

Reference ID
d32599f0

Comment Text Received on Section R402.2.2:

- Why is this section deleted? Are cathedral ceilings now prohibited? We recommend modifying this section to address footnote "b" in Table R402.1.2, and not eliminating the limitation placed on roof area allowed to have lower insulation values.

Action or Other Shown in Final Draft
• Reinserted section as an amendment to address insulation in ceiling without attic spaces instead of addressing in a footnote to Table R402.1.2.

NYStretch-2018 Code Section: Table R402.2.6 Steel-frame ceiling, Wall, and Floor Insulation (R-Value)

Reference ID # for Comments received on Section R402.2.6:

d32599f0

Comment Text Received on Section R402.2.6:

- No updates were made to this table to correlate it with the increased insulation requirements of Table R402.1.2. This table needs to be appropriately adjusted. Steel framing is common in NYC.

Action or Other Shown in Final Draft
• No change required as at least one value that appears in amended Table R402.1.2 appears in Table R402.2.6 in the base 2018 IECC code for each of the climate zones.

NYStretch-2018 Code Section: Amendments to Section R402.4.1.1 (Installation)

Reference ID # for Comments received on Section R402.4.1.1:

d32599f0

Comment Text Received on Section R402.4.1.1:

- "RESNET Grade 1" Insulation requirements needs to be defined and a specific standard needs to be referenced. "RESNET Grade 1" is not a published standard. A website cannot be referenced. Recommendation: do not modify this section, unless a published reference standard can be referenced.

Action or Other Shown in Final Draft
• Modified language so that it removes RESNET reference and inserts written details on requirements.

NYStretch-2018 Code Section: Amendments to Section R403.3 (Ducts)

Reference ID # for Comments received on Section R403.3:

d32599f0

Comment Text Received on Section R403.3:

- This proposed section does not appear to be well coordinated with the other sub-sections. Based on the proposed language, wouldn't R403.3.6 be no longer allowed in a new building? If R403.3.6 is intended to only apply to existing building alterations, then maybe it needs to be moved to R5. Then you have added R403.3.8, but you have deleted R403.3.7. The code must still include the requirements for ducts in unconditioned space in existing buildings (for example, a new AC system is added to an existing building and all equipment and ductwork are in usually installed in an unconditioned attic space- happens all the time!). We recommend coordinating this entire section more carefully.

Action or Other Shown in Final Draft
• Modified Amendments to Section R403.3.1 to address comment and reversed deletion of R403.3.7.

NYStretch-2018 Code Section: Amendments to Section R403.5.4 (Drain water heat recovery units)

Reference ID # for Comments received on Section R403.5.4:

ba83d2f4
d2fc5a59
d309db4e
d32599f0
d3270e12
d331dfbf

Comment Text Received on Section R403.5.4:

- The introductory language "New Buildings" is redundant since Section R403.5.4 only applies to new buildings. Please provide a study that demonstrates hard evidence of the impact of reduced pipe length for public review.
- I feel that R403.5.4.1 is not clear and maybe needs an illustration.
- The energy code should not limit pipe flow rates. That is the domain of the plumbing code. The plumbing code prescribes minimum pipe sizes by fixture, and even those limits can be bypassed by a licensed design professional. It's important that the energy code not limit pipe flow rates because a small pipe size can be used to deliver hot water a longer distance in acceptably short time with acceptably small waste volume. For example, the proposed code limits the flow through 3/8" pipe to 1.5 gpm. However some manufacturers of PEX piping allow up to 10 feet per second velocity, equivalent to 3.0 gpm in a 3/8" PEX pipe - fully *twice* the proposed code limit. The proposed code would force a 3.0 gpm flow to go through a 1/2" pipe, more than doubling the wait time and wasted water. If a design professional determines that the pressure drop, wear, etc through the 3/8" pipe are acceptable, it should be up to them to select that pipe for whatever reasons they choose.
- R403.5.4.4 Recirculation Systems. "...Recirculation systems must be based on an occupant-controlled switch or an occupancy sensor, installed in each bathroom which is located beyond a 0.5 gallon stored-volume range from the water heater." This requirement is impractical for large multifamily buildings because the recirculation loops would take too long to prime. Occupancy sensing would in many cases

deliver the hot water to the user far too late to be effective at reliably delivering hot water in a reasonably short length of time (5 seconds). Occupants will therefore default to the inefficient behavior of turning the hot water on, walking away, and coming back later when they are sure the hot water will have arrived.

- R403.5.4.3 Drain water heat recovery units - this measure seems likely to fail, because the successful operation of drain water heat recovery is not essential to building function. Therefore there's little motivation for parties to install correctly (preheated water plumbed to water heater and preferably cold side of showers) and effectively (insulate preheated lines full length including supports, keep preheated lines short and small diameter, keep drain lines short and of low-mass material, i.e. plastic, wherever possible). There's also potential for selective buildup of gunk inside the drain pipe of its lower temperature. At least one manufacturer (Power Pipe) shows or showed a clean out port directly below their device in installation diagrams. The technology may also be less cost effective than others, e.g. high-quality 1.5 gpm shower heads or photovoltaics. If the measure is implemented, quality assurance should be carefully incorporated in to the code language and specifications. NYSERDA should also study the technology in situ in a randomized sample of buildings to evaluate its cost effectiveness. Pressure drop of the device should not be mandated by energy code. That is the responsibility of the design professional.
- R403.5.4: 3/8" PEX can support upwards of 3.0 gpm (10 ft/s) according to Gary Klein, national hot water system expert, as published in "Efficient Hot Water Piping" in the Journal of Light Construction March 2013. 1.5 gpm just seems too conservative.
- R403.5.4: This section makes installation of these units mandatory. Most drain piping is installed at the ceiling of the basement, then drops to the sewer or septic connection. The heat recovery unit is approximately 53" long and must be installed in the vertical. This cannot be installed in a typical single-store residential building. For a two-story building, the unit costs over $600, not including installation and additional cold water piping.

Action or Other Shown in Final Draft
• Study on impact of reduced pipe length: http://www.garykleinassociates.com/PDFs/15%20-%20Efficient%20Hot-Water%20Piping-JLC.pdf • Removed flow rate requirements from Stretch Code. • No action taken on concern about large multifamily because this applies to the residential portion of the code which is limited to buildings three stories or less. • Added language and references for horizontal heat recovery to address one and two-story buildings

NYStretch-2018 Code Section: Addition of new Section R403.6.2 (Balanced and HRV/ERV systems (Mandatory))

Reference ID # for Comments received on Section R403.6.2:

7d22a5bb
875fab4f
d34e16dd

Comment Text Received on Section R403.6.2:

- I do not agree with the exemption, the "stretch" code should require a fully ducted HRV or ERV system independent of the heating/cooling system.

- Thank you to NYSERDA and BPI for their hard work on this stretch code and for the opportunity to provide this comment. This comment primarily recommends removal of the exception for the H/ERV requirement based on an HVI cost effectiveness study conducted by Newport showing that H/ERVs are cost effective for IRC dwelling units across all of New York's climate zones. See Table 1A below for results. A full copy of the study is also included as an attachment with this comment. Additionally, approving central fan integrated (CFI) balanced systems in New York's climate zones is not good design practice, and will lead to high energy use if operated or poorly managed IAQ if disabled for reasons of comfort and noise. Comfort and noise considerations associated with CFI systems are significant, as noted by one manufacturer's website that advocates for only using the central fan to supply outdoor air

Climate Zone	ERV, Newport Study		HRV, Newport Study	
	Simple Payback (years)	Life Cycle Savings	Simple Payback (years)	Life Cycle Savings
CZ1	9	$235	15	-$552
CZ2	7	$652	10	-$54
CZ3	8	$421	10	$8
CZ4	7	$756	8	$705
CZ5	8	$631	8	$586
CZ6	7	$1,078	7	$1,067
CZ7	6	$1,365	6	$1,339
CZ8	4	$2,559	4	$2,554

Figure 1: A simple payback and life cycle costs for ERVs and HRVs versus a reference ventilation system, which was assumed to be an exhaust-only 60% of the time and a central fan integrated supply-only 40% of the time in each climate zone in Newport's study.

when there is a heating or cooling cycle in process and using an exhaust fan when there is not: "Should regular heating and cooling cycles not run long enough to meet the desired or required ventilation, the AirCycler® g2 can turn on the smaller and more economical bathroom exhaust fan (or other exhaust fan) via the FanConnect™ Switch. With no need to run the large central fan to provide additional ventilation, homeowner complaints of cold air or noisy operation are eliminated and efficiency is drastically improved." At a minimum, a stretch code should require cost effective energy savings across all climate zones and should not encourage substandard design practice. However, in the case that this comment is rejected, at a minimum, there are several changes that should be made to the exception to ensure that the system installed is, in fact, a balanced system and not simply a grouping of exhaust and supply fans whose flow rate and operation may or may not coincide and whose operation could even lead to premature failure of the furnace's heat exchanger.

- The problem with 403.6.2 and HRV systems is that they have air filters in them that require maintenance. Sorry I think homeowners are bad at maintaining equipment and will turn them off and open a window once it breaks or becomes a nuisance.

Action or Other Shown in Final Draft
• Modified text for balanced ventilation language based on recommendations.

NYStretch-2018 Code Section: Amendments to Section R406.6.1 (Compliance software tools)

Reference ID # for Comments received on Section R406.6.1:

d32599f0

Comment Text Received on Section R406.6.1:

- What is the difference between the current standard RESNET/ICC 301 and the 2019 version, and is it certain that the 2019 version will be available when this stretch code is adopted by a municipality?

Action or Other Shown in Final Draft
• Removed year. RESNET/ICC 301 standards are under "continuous maintenance" and several addenda to the first edition of Standard ANSI/RESNET/ICC 301-2014 have been approved. For a summary of approved addenda that will be integrated into the 2019 refer to this RESNET blog post: http://www.resnet.us/blog/bsrresneticc-301-2019-standard-for-the-calculation-and-labeling-of-the-energy-performance-of-dwelling-and-sleeping-units-using-an-energy-rating-index/. There is a preview copy is available

NYStretch-2018 Code Section: Addition of new Section R407 (Additional Energy Efficiency Credits)

Reference ID # for Comments received on Section R407:

7d22a5bb
ebe17f35
d32599f0

Comment Text Received on Section R407:

- Which option should townhomes and semi-detached buildings choose? If multifamily buildings are intended to use Column B, why not clearly state: "1. All residential buildings except multifamily: 2.0 credits taken from Column A in Table R407.1. 2. Multifamily buildings: 3.0 credits taken from Column B in Table R407.1". Must buildings choose at least one option from Rows 1.1- 1.6, and at least one option from Rows 2.1 – 2.6? Or is any combination allowed? For example, projects that meet the requirements of Option 2.2 by selecting a mini-split heat pump with HSPF of 9.0, with no backup resistance heat, the project will receive credit for both 2.1 and 2.2 – for a total of 2 credits in Column A.
- Minor comments : 1/ Table R407.1 1.1 If window area ?15% of conditioned floor area:
  ? Windows U = 0.25 (area weighted average)
  -> You might change "=" with "

Action or Other Shown in Final Draft
• As per the IECC, text was modified to "Detached one and two family dwellings and townhouses". • Added text as follows: Where compliance with one option in Table R407.1 also complies with the requirements of another option, credits can only be claimed for one of those options.

NYStretch-2018 Code Section: Table R407.1 Additional Energy Efficiency Credits

Reference ID # for Comments received on Table R407.1:

7d22a5bb
ebe17f35
d32599f0

Comment Text Received on Table R407.1:

- Clarify if “exterior walls” is meant to only include “above-grade opaque walls”. If a project has exactly 15% window area to conditioned floor area, which item should be chosen? For item 2, what if the weighted average U < 0.25, does this still comply? For item 2, is the intent to only require the window U-factor? Or also the walls? Suggest explicitly listing the requirements in bullet format so there is no confusion.
- Clarify if “exterior walls” is meant to only include “above-grade opaque walls”. Does this include or exclude windows?

Action or Other Shown in Final Draft
• Removed Option 1.1 because the U-factor in the base package was modified to be 0.045. • Added text to clarify above-grade opaque walls

NYStretch-2018 Code Section: Addition of New Section R408 (Passive House)

Reference ID # for Comments received on Section R408:

ea1f7b38
d2d12070
d306b493
d318e78a
d334a91b

Comment Text Received on Table R408:

"...achieves a Certified Passive House Consultant verified Specific Space Heating or Cooling Demand is less than or equal to 9.5 kBTU/ft2/year." In my opinion this should say "...Space Heating AND Cooling Demand..." as both criteria must be met in a given building.

- It should be specified that the cooling demand limit of 9.5 kBTU/ft/year only includes the sensible cooling demand but not the dehumidification demand. The specs and requirements displayed on the PHPP Verification tab only show the total of both. That's why the limit value displayed in PHPP can be higher than 9.5, especially in multifamily buildings with high occupancy and correspondingly higher internal humidity loads. This could lead to confusion or requirements which are too strict.
- That said, all residential Passive Houses will be much better than the 9.5 regarding cooling demand. Still we would want to avoid some people becoming upset, if they have a PHI Low Energy Building according to the PHPP Verification tab but do not qualify for the NYC criteria.
- Include Specific Space Cooling Demand for PHIUS and PHI approved software. Both PHIUS and PHI Standards should be treated equally.
- The only modification that I would request is in R408.2.2.b.i: PHI uses the titles of 'Certified Passive House Consultant' and 'Certified Passive House Designer' for people who they certify can design a Passive House, and it would be good to include both titles on that section.

Action or Other Shown in Final Draft
• Removed 2015 from PHIUS+ • Modified text to read: specific space heating and (sensible only) cooling demand…" • Modified requirements in 408.1.1. Passive House Institute US (PHIUS) Approved Software. PHIUS+2015 to include (sensible only) cooling demand. • Modified text in 408.1.2 Passive House Institute (PHI) Approved Software to read "exhibit an infiltration rate of no more than 1.0 air changes per hour under a pressure of 50 Pascals."