City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [CE], Section C402.3

Submitted by: Smart Surfaces Coalition

C402.3 Above-grade wall solar reflectance.

For Climate Zones 0 through 2, above-grade *east-oriented*, *south-oriented* and *west-oriented* walls shall comply with either of the following:

1. Not less than 75 percent of the opaque *above-grade wall* area shall have an area-weighted initial solar reflectance of not less than 0.30 where tested in accordance with ASTM C1549 with AM1.5GV output or ASTM E903 with AM1.5GV output, ANSI/CRRC S100-2025, or determined in accordance with an *approved source*. This *above-grade wall* area shall have an *emittance* or emissivity of not less than 0.75 where tested in accordance with ASTM C835, ASTM C1371, ASTM E408, ANSI/CRRC S100-2025, or determined in accordance with an *approved source*. For the portion of the *above-grade wall* that is glass spandrel area, a solar reflectance of not less than 0.29, as determined in accordance with NFRC 300 or ISO 9050, shall be permitted. Area-weighted averaging is permitted using only *south-*, *east-* and *west-oriented* walls enclosing the same occupancy classification.
2. ~~Not less than 30 percent of the opaque *above-grade wall* area shall be shaded by manmade structures, existing buildings, hillsides, permanent building projections, on-site renewable energy systems or a combination of these. Shade coverage shall be calculated by projecting the shading surface downward on the *above-grade wall* at an angle of 45 degrees.~~

   Exception: A*bove-grade walls* of low-energy buildings complying with Section C402.1.1.1, greenhouses complying with Section C402.1.1.2 and equipment buildings complying with Section C402.1.1.3.

Justification: Expand Cool Wall Requirements of 2024 IECC to include Climate Zone 2.

The Smart Surfaces Coalition proposes an amendment to the 2024 IECC that extends cool wall requirements to Climate Zone 2 to include the City of Phoenix. Currently, the 2024 IECC mandates cool walls only in the prescriptive path for Climate Zone 0, which is located outside of the U.S. Expanding cool wall provisions into the mandatory section would significantly enhance building energy efficiency, mitigate urban heat, and improve occupant comfort in the Phoenix climate where cooling loads are significant**.**

Cool walls, like cool roofs, are designed to reflect sunlight, reducing unwanted solar heat gain in buildings and surrounding areas. Reflective walls are generally light-colored but are also available in various darker colors using advanced pigments designed to reflect solar energy. Although the solar energy striking an east or west wall is about half of what hits a horizontal roof, residential walls typically have only half the insulation of roofs. As a result, increasing the solar reflectance of exterior walls can provide similar benefits to cool roofs in reducing heat transfer into interior spaces.

Cool walls deliver comparable benefits to those provided by cool roofs, including annual energy savings, peak demand reduction, decreased emissions, and urban heat island mitigation. For example, cool walls can reduce annual HVAC energy costs in single-story buildings by up to 27% (1). In Phoenix, cool walls can save $0.05 per square foot on annual energy bills (2). This reduction in energy consumption translates directly into reduced greenhouse gas emissions, contributing to climate change mitigation and improvements in air quality. In addition to energy and emissions benefits, cool walls improve comfort and safety. By lowering indoor temperatures, cool walls reduce reliance on air conditioning and protect occupants from extreme heat events in unconditioned spaces or during power outages.

1. https://doi.org/10.20357/B7SP4H [doi.org]
2. https://coolroofs.org/documents/Cool-Exterior-Wall-Potential-Energy-Savings_2024-07-15.pdf [coolroofs.org]

Staff Committee Rationale for Recommendation: This is optional in the 2024 code, and the amendment would make it too restrictive for applicants.

Cost Impact: No cost impact. There is typically no cost difference between wall paints and materials of different colors.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 01/16/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken
City Council Action	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [CE], Section C402.3

Submitted by: Cool Roof Rating Council

C402.3 Above-grade wall solar reflectance.
For Climate Zone 2B~~0~~, above-grade *east-oriented*, *south-oriented* and *west-oriented* walls shall comply with either of the following:

1. Not less than 75 percent of the opaque *above-grade wall* area shall have an area-weighted initial solar reflectance of not less than 0.30 where tested in accordance with ASTM C1549 with AM1.5GV output or ASTM E903 with AM1.5GV output, ANSI/CRRC S100-2025, or determined in accordance with an *approved source*. This *above-grade wall* area shall have an *emittance* or emissivity of not less than 0.75 where tested in accordance with ASTM C835, ASTM C1371, ASTM E408, ANSI/CRRC S100-2025, or determined in accordance with an *approved source*. For the portion of the *above-grade wall* that is glass spandrel area, a solar reflectance of not less than 0.29, as determined in accordance with NFRC 300 or ISO 9050, shall be permitted. Area-weighted averaging is permitted using only *south-*, *east-* and *west-oriented* walls enclosing the same occupancy classification.
2. Not less than 30 percent of the opaque *above-grade wall* area shall be shaded by manmade structures, existing buildings, hillsides, permanent building projections, on-site renewable energy systems or a combination of these. Shade coverage shall be calculated by projecting the shading surface downward on the *above-grade wall* at an angle of 45 degrees.

Exception: *Above-grade walls* of low-energy buildings complying with Section C402.1.1, greenhouses complying with Section C402.1.1.2 and equipment buildings complying with Section C402.1.1.3.

CHAPTER 6 [CE] REFERENCED STANDARDS

CRRC ANSI/CRRC S100-2025: Standard Test Methods Determining Radiative Properties of Materials

Justification:

The Cool Roof Rating Council (CRRC) proposes the City of Phoenix adopt an amendment to the 2024 International Energy Conservation Code (IECC) that extends the existing prescriptive requirement in Section C402.3 (Above-grade wall solar reflectance) to Climate Zone 2B (where Phoenix is located) and to also add references to ANSI/CRRC S100-2025, a consensus-based standard that specifies the appropriate testing and field exposure requirements for various types of exterior wall paints and claddings (https://coolroofs.org/resources/ansi-crrc-s100 [coolroofs.org]).

The ANSI/CRRC S100 standard (2025) is an American National Standard that covers test specimen preparation and test methods for measuring the initial and aged radiative properties of roofing and exterior wall materials. It is a complete technical

document that references other consensus standards, such as ASTM C1549, C1371, E903, and E1918, to standardize the testing, aging, and reporting of the surface radiative properties of various roofing and exterior wall materials. The Slide Method, which is the correct method for measuring the thermal emittance of liquid-applied roof and wall coatings, is also referenced in the ANSI/CRRC S100 standard.

The ANSI/CRRC S100 standard is referenced by building codes and rating programs worldwide in order to measure the initial and aged solar reflectance and thermal emittance of roofing and exterior wall materials. Some of the codes and standards that reference the CRRC S100 standard are the International Energy Conservation Code, ASHRAE Standard 90.1, International Residential Code, International Green Construction Code, RESNET Standard 301, Florida Building Code, Hawaii State Energy Code, Texas State Building Code, and the Phoenix Building Construction Code.
Amend Section C402.3 to include Climate Zone 2B and add references to ANSI/CRRC S100-2025 for Solar Reflectance and Thermal Emittance Testing

A 2019 California Energy Commission research study led by Lawrence Berkeley National Laboratory, the University of Southern California, and the University of California at San Diego found that highly reflective “cool” exterior walls produce annual HVAC energy savings in Climate Zones 1 through 4 (southern half of the United States) and across all 16 of California’s climate zones for all buildings of any vintage (Levinson et al. 2019).

When an exterior wall surface highly reflects solar radiation, it lowers the surface temperature of the wall material and reduces the building’s solar heat gain. Reduced heat gain lowers the building’s indoor temperature. For air-conditioned buildings, reduced heat gain helps lower the building’s cooling demand and, by extension, reduces the amount of waste heat released by air conditioning units (Zhang et al., 2018). Less waste heat leads to lower outdoor temperatures, which improves air quality by slowing the formation of ground-level ozone that can trigger severe health problems and contribute to smog formation (Zhang et al., 2019; US EPA, 2022).

Reduced cooling demand also helps decrease peak power demand (Rosado & Levinson, 2019) which can alleviate strain on the electrical grid, lowering the risk of blackouts and brownouts, and lessen the use of peaker plants. Reductions in peak and conventional power generation also decrease the emission of greenhouse gases (Zhang et al., 2019; Rosado & Levinson, 2019).

Though roofs are typically exposed to more sunlight than walls, the comparable savings from cool exterior walls result from walls having less insulation than roofs, with about half the amount of resistance to heat flow achieved by a roof. Further, cool exterior walls influence the HVAC energy use of every floor of a multi-story building, whereas cool roofs mainly affect the HVAC energy use of only the top floor (Rosado & Levinson, 2019).

Exterior paints, claddings, and other wall products sold today have solar reflectances ranging from about 5% (black) to 90% (bright white). A standard dark- to medium-colored wall might reflect 25% of sunlight, whereas a typical off-white or dull-white wall might reflect 60%. A clean bright-white wall could reflect 80% of sunlight. Some products are colored with conventional pigments, and others use special infrared reflective pigments that boost the solar reflectance of darker surfaces. The coated-metal industry has been using these special pigments for years.

Cool exterior walls are also a viable mechanism for urban heat island (UHI) mitigation. For example, Zhang et al. (2019) found that cool exterior walls in Los Angeles yield about 85% of the daily average air cooling achieved with cool roofs in the month of July. The researchers used the Weather Research and Forecasting model to simulate the effects of cool exterior walls and cool roofs on the near-ground (at a height of 6.56 ft [2 m]) outdoor air temperature in the Los Angeles Basin. They found that for equal increases in solar reflectance, cool exterior walls were nearly as effective as cool roofs. This finding is notable because walls receive less daily solar irradiance than roofs since there is about 50% more net wall area (walls minus windows) than roof area in Los Angeles. Walls are also closer to ground air than the roofs (the average wall height is half the average roof height) (Zhang et al., 2019).

The City and County of Honolulu has recognized the impacts of cool exterior walls by being the first jurisdiction in the nation to adopt cool wall provisions into its building code in 2023 (based on 2018 IECC with local amendments).

References

1. Levinson, R., G. Ban-Weiss, P. Berdahl, et al. 2019. Solar-Reflective “Cool” Walls: Benefits, Technologies, and Implementation: Final Project Report. State of California Energy Commission report CEC-500-2019-040. https://doi.org/10.20357/B7SP4H [doi.org].
2. Zhang, J., A. Mohegh, Y. Li, R. Levinson, and G. Ban-Weiss. 2018. “Systematic Comparison of the Influence of Cool Wall versus Cool Roof Adoption on Urban Climate in the Los Angeles Basin.” Environmental Science and Technology 52 (19): 11188-11197. https://doi.org/10.1021/acs.est.8b00732 [doi.org].
3. Zhang, J., Y. Li, W. Tao, J. Liu, R. Levinson, A. Mohegh, and G. Ban-Weiss. 2019. “Investigating the Urban Air Quality Effects of Cool Walls and Cool Roofs in Southern California.” Environmental Science and Technology 53 (13): 7532-7542. https://doi.org/10.1021/acs.est.9b00626 [doi.org].
4. U.S. Environmental Protection Agency. 2022. “Health Effects of Ozone Pollution.” Last updated June 14, 2022. https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution [epa.gov].
5. Rosado, P. J., and R. Levinson. 2019. “Potential Benefits of Cool Walls on Residential and Commercial Buildings across California and the United States: Conserving Energy, Saving Money, and Reducing Emission of Greenhouse Gases and Air Pollutants.” Energy and Buildings 199: 588-607. https://doi.org/10.1016/j.enbuild.2019.02.028 [doi.org].

Staff Committee Rationale for Recommendation: This is optional in the 2024 code, and the amendment would make it too restrictive for applicants.

Cost Impact: Minimal cost impact. There is typically no cost differential between paints and claddings of various colors, such as white, light-colored, and darker-colored paints and siding materials. However, there are products that are formulated with special pigments, such as those that utilize infrared-reflective pigments that enable darker colors to reflect more solar radiation than those formulated with conventional pigments. These products may come at a cost premium. More information can be found in the 2019 CEC study about cool walls: (https://doi.org/10.20357/B7SP4H [doi.org]).

Additionally, the CRRC provides an online database of various exterior wall materials with their radiative property data that aids in policymaking and code compliance and enforcement: https://coolroofs.org/directory/wall [coolroofs.org].

The database is updated in real time as products complete the CRRC's third-party rating process. More information about the CRRC Wall Rating Program can be found here: https://coolroofs.org/programs/wall-rating-program [coolroofs.org].

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:				
2024 Code Committee				Date: 01/16/2025
☐ Approved as submitted	☐ Modified and approved	☒ Denied	☐ No action taken	
Development Advisory Board (DAB) Subcommittee				Date: 03/06/2025
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Development Advisory Board (DAB)				Date: 04/22/2025
☐ Approved as submitted	☐ Modified and approved	☒ Denied	☐ No action taken	
Transportation, Infrastructure and Planning Subcommittee				Date:
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City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL
Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [CE], Section C402.4

Submitted by: Smart Surfaces Coalition

~~C402.4~~ C401.4 Roof solar reflectance and thermal emittance
Low slope roofs in Climate Zones 0 through 3 shall comply with one or more of the options in Table C401.4.

Exceptions: The following roofs and portions of roofs are exempt from the requirements of Table C401.4:

1. Portions of the roof that include or are covered by the following:
   ~~1.1 Photovoltaic systems or components.~~
   ~~1.2~~ 1.1 Solar air or water-heating systems or components.
   ~~1.3~~ 1.2 Vegetative roofs or landscaped roofs.
   ~~1.4~~ 1.3 Above-roof decks or walkways.
   ~~1.5~~ 1.4 Skylights.
   ~~1.6~~ 1.5 HVAC systems and components, and other opaque objects mounted above the roof.

~~2. Portions of the roof shaded during the peak sun angle on the summer solstice by permanent features of the building or by permanent features of adjacent buildings.~~

~~3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (74 kg/m^2) or 23 psf (117 kg/m^2) pavers.~~

~~4.~~2. Roofs where not less than 75 percent of the roof area complies with one or more of the exceptions to this section.

~~TABLE C402.4~~TABLE C401.4 MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

Three-year-aged solar reflectance[b] not less than ~~0.55~~0.70 and a 3-year aged thermal emittance[c] of 0.75
Three-year-aged solar reflectance index[d] not less than ~~64~~85

a. The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged-tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section ~~C402.4.1~~C401.4.1 and a 3-year-aged thermal emittance of 0.90.
b. Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-S100.
c. Aged thermal emittance tested in accordance with ASTM C1371 or ASTM E408 or CRRC-S100.
d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E1980 using a convection coefficient of 2.1 Btu/h x ft^2 x °F (12 W/m2x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance

~~C402.4.1~~ C401.4.1 Aged roof solar reflectance
Where an aged solar reflectance required by Section ~~C402.4~~ C401.4 is not available, it shall be determined in accordance with Equation 4-2.

Equation 4-2: $R_{aged} = [0.2 + 0.7(R_{initial} – 0.2)]$

where:

R_{aged} = The aged solar reflectance.

$R_{initial}$ = The initial solar reflectance determined in accordance with CRRC-S100.

R401.2 Application

Residential buildings shall comply with Section R401.4 and either R401.2.1, R401.2.2, R401.2.3 or R401.2.4.

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

R401.4 Roof solar reflectance and thermal emittance

R401.4.1 Low slope roof solar reflectance[a]

Low slope roofs in Climate Zones 0 through 3 shall achieve a 3-year aged solar reflectance[b] not less than 0.70 and a 3-year aged solar reflectance index[c] not less than 85.

Exceptions: The following roofs and portions of roofs are exempt from the requirements of Section R401.4.1:

1. Portions of the roof that include or are covered by the following:
   1.1 Solar air or water-heating systems or components.
   1.2 Vegetative roofs or landscaped roofs.
   1.3 Above-roof decks or walkways.
   1.4 Skylights.
   1.5 HVAC systems and components, and other opaque objects mounted above the roof.
2. Roofs where not less than 75 percent of the roof area complies with one or more of the exceptions to this section.

   a. The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section R401.4.3 and a 3-year-aged thermal emittance of 0.90.
   b. Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-S100.
   c. Solar reflectance index (SRI) shall be determined in accordance with ASTM E1980 using a convection coefficient of 2.1 Btu/h x ft^2 x °F (12 W/m^2x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance.

R401.4.2 Steep slope roof solar reflectance[a]

Steep slope roofs in Climate Zones 0 through 3 shall achieve one of the following: for metal roofing, a 3-year-aged solar reflectanceb not less than 0.50; for tile roofs, a 3-year-aged solar reflectance not less than 0.40; or for roofs of any other material, a 3-year aged solar reflectance not less than 0.27 and a 3-year aged solar reflectance indexc not less than 27.

   a. The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section R401.4.3 and a 3-year-aged thermal emittance of 0.90.
   b. Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-S100.

c. Solar reflectance index (SRI) shall be determined in accordance with ASTM E1980 using a convection coefficient of 2.1 Btu/h x ft2 x °F (12 W/m2x K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance.

R401.4.3 Aged roof solar reflectance

Where an aged solar reflectance required by Section R401.4.1 or R401.4.2 is not available, it shall be determined in accordance with Equation 4-3.

Equation 4-3: $R_{aged} = [0.2 + 0.7(R_{initial} – 0.2)]$

where:

R_{aged} = The aged solar reflectance.

$R_{initial}$ = The initial solar reflectance determined in accordance with CRRC-S100.

Justification:

Phoenix's current average roof albedo is 0.40 for low-slope (nonresidential) buildings and 0.22 for steep-slope (residential) buildings (1). The proposed code amendment sets a solar reflectance requirement of 0.70 for low-slope roofs, and for steep slope roofs, material-specific thresholds of 0.50 for metal roofs, 0.40 for tile roofs, and 0.27 for asphalt shingles or other non-metal or non-tile material. These requirements would significantly reduce citywide temperatures, energy consumption and peak demand, and heat-related health impacts and mortality, all while saving money for Phoenix residents and businesses.

Heat is the deadliest form of weather globally, claiming more lives than any other natural disaster. In 2024, Maricopa County recorded 466 heat-related deaths, underscoring the urgent need for effective cooling strategies in the Valley (2). Large-scale deployment of cool roofs in Phoenix could lower air temperatures up to 2°F citywide, and higher in neighborhoods with more dark, impervious surfaces.

Energy savings: Cool roofs deliver measurable energy savings by reducing the need for air conditioning, particularly during peak demand periods. Citywide deployment of cool roofs in Phoenix could reduce summertime cooling energy demand by 14% on average (3). City-owned properties in Phoenix that have implemented cool roof coatings have already achieved a 17% reduction in building energy consumption (4). By lowering peak electricity demand, cool roofs reduce energy costs and improve grid stability, mitigating the risk of blackouts during heatwaves. The Oak Ridge National Laboratory Cool Roof Calculator estimates that adopting cool roofs in Phoenix on 90% of available roofs could save ratepayers ~$42.3M annually in electricity costs. This would also reduce CO2e emissions by more than 200,000 metric tons each year, valued at nearly $40 million (according to EPA estimates of the Social Cost of Carbon).

Additionally, cool roofs enhance the operation of rooftop solar PV systems – on average, adoption of cool roofs in accordance with the proposed code amendments would increase energy production of monofacial solar PV in Phoenix by 2.1% on low-slope roofs and 0.36% on steep-slope roofs (5). Reflective roofs also improve the performance and lifespan of rooftop HVAC systems by reducing thermal stress on equipment and lowering intake air temperatures. The proposed amendment removes the exemption for portions of the roof covered by photovoltaic systems or components to ensure that this enhanced performance benefit is accrued.

Public health & wellbeing: Cool roofs help maintain cooler indoor environments, protecting occupant health, comfort, and safety. In non-air-conditioned residential buildings, cool roofs can lower maximum indoor temperatures by 2 to 6°F, reducing the risk of heat stress and illness (6). When considering the economic impact of mortality, morbidity, labor productivity, and energy

consumption, cool roofs in Phoenix provide an estimated $5.25 return on investment for every $1 invested (7). Cool roofs adopted citywide would decrease outdoor air temperatures and the urban heat island effect, improve air quality by decreasing smog formation and reduce electricity consumption. The resulting reductions in health impacts from air quality translate to an estimated $1.65M in annual health savings (8).

Additional benefits: Cool roofs offer several other ancillary benefits. By reflecting more solar energy out of the atmosphere, cool roofs offset global warming caused by greenhouse gases, contributing to global cooling (9). Cool roofs also experience less thermal stress and degradation due to lower heat absorption, potentially extending the roof's lifespan and reducing maintenance costs. Citywide deployment of cool roofs could also reduce the city's irrigation water demand by up to 9% (10).

1. https://github.com/wri/cities-OpenUrban/wiki/LULC-mapping-V3-USA [github.com]
2. https://www.maricopa.gov/1858/Heat-Surveillance [maricopa.gov]
3. https://doi.org/10.1007/s10546-016-0160-y [doi.org]
4.https://www.phoenix.gov/oepsite/Documents/UHITS%20Cool%20Roof%20Update%20May%202021.pdf
5. https://doi.org/10.1016/j.solener.2023.111948 [doi.org]
6. https://www.sciencedirect.com/science/article/pii/S0378778807000126?via=ihub [sciencedirect.com]
7.https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_EcoHeatAssement_AZ_Report.pdf [nature.org]
8. https://cobra.epa.gov/ [cobra.epa.gov]
9. https://coolroofs.org/documents/CRRC-Atmospheric-Cooling-with-Cool-Roofs_2024-06-14.pdf [coolroofs.org]
10. https://www.nature.com/articles/s41467-017-01346-1 [nature.com]

Staff Committee Rationale for Recommendation: There are many references to Section C401.4 and Table C401.4 in the 2024 IECC. These do not exist as written in the 2024 IECC.

The proposal references both residential and commercial code sections. The amendment can only address one or the other, not both.

If the proposal intends to have photovoltaic systems and its components removed from the listed exceptions, this committee notes that photovoltaic systems actually provided solar protection to buildings by removing the solar effect on the building surface.

As written, the committee cannot see a justification and overall, it is unclear what the applicant is proposing.

Cost Impact: The information below outlines the costs of flat or low-slope roof materials in Phoenix, including material and installation costs sourced from RSMeans construction cost data. White TPO (thermoplastic polyolefin) is typically the lowest-cost roofing material and boasts high reflectivity, making it the most cost-effective option for low-slope roofs.

Material: TPO
Standard Warranty: 15-35 years
Installed Cost ($/ft2): $2.35

Material: EPDM
Standard Warranty: 5-30 years
Installed Cost ($/ft2): $2.57

Material: PVC
Standard Warranty: 15-30 years
Installed Cost ($/ft2): $2.97

Material: Built-Up Roofing
Standard Warranty: Up to 20 years
Installed Cost ($/ft2): $3.51

As referenced above, for low-slope roofs, the cool white TPO products actually have a lower first cost than dark roofing options like black EPDM. For steep slope options, there are cool asphalt shingle roof products available that are cost-competitive with conventional, darker steep-slope roof products.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 01/16/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025
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City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [CE], Section C405.12-C405.12.1

Submitted by: Darrel R. Miller, PE, LEED-AP, ICC Certified Electrical Plans Examiner

~~**C405.12 Automatic receptacle control.**~~

~~The following shall have automatic receptacle control complying with Section C405.12.1:~~

~~1. At least 50 percent of all 125V, 15- and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms and individual workstations, including those installed in modular partitions and module office workstation systems.~~
~~2. At least 25 percent of branch circuit feeders installed for modular furniture not shown on the construction documents..)~~

~~**C405.12.1 Automatic receptacle control function.**~~

~~Automatic receptacle controls shall comply with the following:~~

~~1. Either split controlled receptacles shall be provided with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches (304.8 mm) of each uncontrolled receptacle.~~
~~2. One of the following methods shall be used to provide control~~
~~2.1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5,000 square feet (464.5 m) and not more than one floor. The occupant shall be able to manually override an area for not more than 2 hours. Any individual override switch shall control the receptacles of not more than 5,000 feet (1524 m).~~
~~2.2. An occupant sensor control that shall turn off receptacles within 20 minutes of all occupants leaving a space.~~
~~2.3. An automated signal from another control or alarm system that shall turn off receptacles within 20 minutes after determining that the area is unoccupied.~~
~~3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.~~
~~4. Plug-in devices shall not comply.~~

~~**Exceptions:** Automatic receptacle controls are not required for the following:~~

~~1. Receptacles specifically designated for equipment requiring continuous operation (24 hours per day, 365 days per year).~~
~~2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.~~
~~3. Within a single modular office workstation, noncontrolled receptacles are permitted to be located more than 12 inches (304.8 mm), but not more than 72 inches (1828 mm) from the controlled receptacles serving that workstation.~~

C405.12 Automatic receptacle control. **COMPLIANCE OPTIONAL**

The following shall have automatic receptacle control complying with Section C405.12.1:

1. At least 50 percent of all 125V, 15- and 20-amp receptacles installed in enclosed offices, conference rooms, rooms used primarily for copy or print functions, breakrooms, classrooms and individual workstations, including those installed in modular partitions and module office workstation systems.
2. At least 25 percent of branch circuit feeders installed for modular furniture not shown on the construction documents..)

C405.12.1 Automatic receptacle control function.

Automatic receptacle controls shall comply with the following:

1. Either split controlled receptacles shall be provided with the top receptacle controlled, or a controlled receptacle shall be located within 12 inches (304.8 mm) of each uncontrolled receptacle.
2. One of the following methods shall be used to provide control
   2.1. A scheduled basis using a time-of-day operated control device that turns receptacle power off at specific programmed times and can be programmed separately for each day of the week. The control device shall be configured to provide an independent schedule for each portion of the building of not more than 5,000 square feet (464.5 m) and not more than one floor. The occupant shall be able to manually override an area for not more than 2 hours. Any individual override switch shall control the receptacles of not more than 5,000 feet (1524 m).
   2.2. An occupant sensor control that shall turn off receptacles within 20 minutes of all occupants leaving a space.
   2.3. An automated signal from another control or alarm system that shall turn off receptacles within 20 minutes after determining that the area is unoccupied.
3. All controlled receptacles shall be permanently marked in accordance with NFPA 70 and be uniformly distributed throughout the space.
4. Plug-in devices shall not comply.

Exceptions: Automatic receptacle controls are not required for the following:

1. Receptacles specifically designated for equipment requiring continuous operation (24 hours per day, 365 days per year).
2. Spaces where an automatic control would endanger the safety or security of the room or building occupants.
3. Within a single modular office workstation, noncontrolled receptacles are permitted to be located more than 12 inches (304.8 mm), but not more than 72 inches (1828 mm) from the controlled receptacles serving that workstation.

Justification: 2024 IECC C405.12 Proposed Change – A postulate against implementation. This proposal is based on the assumption that the City of Phoenix wants to be known as a business friendly city. One way this can be achieved is by the establishment of practical building codes that focus on public safety, rather than unrelated requirements that have no benefit to the citizens of the City and add a cost burden to the conforming business or property owner.

This electrical system requirement offers an extremely low return on investment and as such is an item that detracts from a business-friendly environment. If this item was assessed on a basis of payback, it would never be implemented based on the number of years it would take to recover the investment costs. It is my opinion this requirement should not be codified, rather it should be left to the conscience of the individual business as to how they spend their money.

If a business chooses to be more energy conscious, the proposed code change (deletion) will not prevent implementing a more stringent requirement on themselves. For other businesses that do not have the same environmental concerns there would be no penalty.

What is this Code provision addressing? This section of the code pertains to "parasitic plug loads" which are known to be extremely small (milliwatts) and equipment “standby loads”. Each represents inconsequential loads for the building power system. The management of these loads as required in the proposed 2024 IECC C405.12 language implement an additional control system previously not a part of the 2018 IECC, currently adopted. The new requirements have targeted areas of a building that are most likely to have the previously described loads, offices (enclosed and open), conference rooms, copy/print rooms, break rooms, classrooms, individual workstations (stand alone or modular type) mandating 50% of the receptacles in the space to be controlled by a system (choose one of (3) options, none of which are practical).

Implementation will introduce the following:
• 50% loss of the continuous power receptacles within the space or increase the receptacle quantity by 100% so as to maintain the original quantity available prior to implementation of this code.
• Invoke training for new space occupants as to the functionality (or dysfunctionality) of the power receptacle system in the space they will be working in. Likely inclusive of how to avoid use of the controlled receptacles to assure your tablets and phones and computer batteries are always functional when you need them.
• Specially marked receptacles identifying they are controlled. Thanks to California Energy Codes, these are available from the majority of device manufacturers.
• Dedicated wiring system from dedicated relays or panels or other types of controller.
• Control systems to provide independent control of each area up to 5000 SF at no less that one zone of control per floor.
• Control override buttons allowing a control override for up to 2 hours separately for each of the spaces controlled by such override buttons (limited to 5,000 SF per button or no less than one per floor).
• Not specifically mentioned but certainly will be required for clarity to those using the system, each button station will need an associated placard/graphic indicating the spaces controlled by such override buttons.
• Where modular furniture is not shown specifically on the design plans, and it is commonly not shown, a mandate that 25% of the branch circuits to the identified modular furniture must be dedicated to controlled receptacles. This could be a large number of circuit additions in larger open office spaces.

Indirect effects of implementation:
• Increased Building Safety Department plan review time to assure design compliance.
• Increased Building Safety inspection time to assure actual compliance
• Nuisance operation of the electrical system for the user of the space.

Real world issues:
Consider that your cell phone is plugged into a charger while you are out at lunch. Why? You need to have it for an out of office meeting following lunch. Your battery was low, so you plugged it in. You come back and find the charger has been off starting 20 minutes following your departure from your enclosed office. Why? Because the control system for the lighting also shuts off the controlled receptacle with the lights (one of the most cost effective ways to control these receptacles that is listed in the prescriptive choices). Yes, this is how the controlled receptacles are intended to operate.

Now consider a Police sergeant or detective in your office at the station going in for a briefing. The officer plugs in a Taser for a refresh charge. The briefing goes long. When arriving back in

the office to retrieve the Taser, finds the outlet has shut off with the lights. Now it is not ready for use. Same with the cell phone, laptop, radio, or any other battery device necessary for their tour. If the lighting system turns off due to a lack of occupants in the space, the controlled receptacles also will turn off. This is one of the prescribed choices in the code, and it happens to be the most cost effective as well.

The other prescribed choices do not practically work in a building such as are designed for law enforcement, and I would argue, Fire Departments as well. This code has no occupancy type exceptions to practically apply it to Public Safety facilities. This is a problem.

Controlled receptacles for printers and copy machines – Implementing the controlled receptacle requirement for copiers and other office equipment is unnecessary and potentially harmful for the equipment. A hard restart is not a desired shut down method for the office equipment. This is effectively what the controlled receptacle is doing, an abrupt power down, equivalent to a utility power outage. Additionally, shutting off power to the equipment based on occupancy or even based on a timeclock will cause a restart cycle, delaying its use.

The downtime for office staff is calculable and adds to the operational costs to the business. It is in the business owner's best interest to purchase office equipment with energy star certifications. This will naturally occur just from availability and benefits. Equipment with an Energy Star certification must meet strict energy efficiency criteria set by the EPA, including features like low power consumption in sleep mode, quick transition to sleep mode after inactivity, and efficient power supplies. By definition, the Energy Star Certified equipment is performing the functions the IECC mandates are attempting to provide, but without the pitfalls. The IECC requirements in C405.12 are impractical. Cord and plug equipment control should be left to up to the business owner rather than a dictate from City Hall.

Other considerations:
It has been the City policy to ignore energy code related requirements from an electrical perspective relative to the purposes of plan review because they are not related to life safety. A permit is not to be held up for lack compliance with an energy code element. If the policy remains, then the inspections department is going to be the one to assure compliance. This will add time to electrical building inspections and create angst with the construction teams, as these items are ironed out after construction is well under way.

If the policy is changed to require compliance be shown on the plans prior to permit issuance, plan review time will increase which effectively should require additional plan review fees for said services. An energy code deficient electrical plan submittal would be subject to delay if energy code compliance could hold up a plan approval. Generally, the controlled receptacle requirements are such that a plan reviewer will not be able to effectively add a comment on a drawing resolving a deficient plan, which is how minor deficiencies are presently handled to expedite the review process. If the energy code was not important enough to hold up a plan review today, why should it be in the future? It follows that if it is not important enough now to hold up a plan review, what is the point of adding more regulation that will not be implemented?

If it is the intention to require conformance to the proposed IECC, the following will be needed to properly implement this portion of the Energy Code:
• Additional personnel within the Building Safety Department of the City to meet the State mandated turn-around times.
• Additional training is needed for electrical plan reviewers related to what must be on the plans to meet the minimum conformance criteria.
• A published check list must be developed and published to the Design Community if there is any chance of attaining compliant design plans within the mandated plan review times.
• Possible solution would be to add an Energy Review team that solely reviewed IECC

compliance and make it one of the disciplines equal to electrical, mechanical/plumbing, fire, building, structural.
• Possible similar solution with the Building Inspection teams.

Recommendation:
Strike 2024 IECC C405.12 from adoption based on the above arguments.
Striking this provision for controlled receptacles has no effect on the plan review, inspections, or design community. It shows Phoenix is willing to maintain a logical approach to energy conservation while retaining a business friendly environment. It means there will be no related workload burden placed on the Electrical Plans Reviewers or Electrical Inspector. There will be no need for plan review fee increases to the public related to this issue.

Fall back option:
Make 2024 IECC C405.12 and "Optional Code" for Owners to follow, much like the Green Building Code of the past. It looks good to the non-discerning but has no real affect.

Staff Committee Rationale for Recommendation: The Committee thinks energy monitoring and automatic receptacle control requirements are expensive for the energy savings that will eventually be realized.

However, likewise and in comparison, the Committee thought similarly regarding LED lighting when it first came out, but the cost for LED lighting has dramatically decreased over time

See staff-modified version.

Cost Impact: Cost reductions to City Plan Review and Inspections over implementation w/o proposed amendment.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 01/16/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [CE], Section C405.13

Submitted by: Darrel R. Miller, PE, LEED-AP, ICC Certified Electrical Plans Examiner

~~**C405.13 Energy monitoring.**~~

~~New buildings with a gross conditioned floor area of not less than 10,000 square feet (929 m) shall be equipped to measure, monitor, record and report energy consumption in accordance with Sections C405.13.1 through C405.13.6 for load categories indicated in Table C405.13.2 and Sections C405.13.7 through C405.13.11 for end-use categories indicated in Table C405.13.8.~~

~~**Exceptions:**~~

~~1. Dwelling units in R-2 occupancies.~~
~~2. Individual tenant spaces are not required to comply with this section provided that the space has its own utility services and meters and has less than 5,000 square feet (464.5 m) of conditioned floor area.~~

C405.13 Energy monitoring. COMPLIANCE OPTIONAL

New buildings with a gross conditioned floor area of not less than 10,000 square feet (929 m) shall be equipped to measure, monitor, record and report energy consumption in accordance with Sections C405.13.1 through C405.13.6 for load categories indicated in Table C405.13.2 and Sections C405.13.7 through C405.13.11 for end-use categories indicated in Table C405.13.8.

Exceptions:

1. Dwelling units in R-2 occupancies.
2. Individual tenant spaces are not required to comply with this section provided that the space has its own utility services and meters and has less than 5,000 square feet (464.5 m) of conditioned floor area.

Justification: 2024 IECC C405.13 Proposed Change – A postulate against implementation. This proposal is based on the assumption that the City of Phoenix wants to be known as a business friendly city. One way this can be achieved is by the establishment of practical building codes that focus on public safety, rather than unrelated requirements that have no benefit to the citizens of the City and add a cost burden to the conforming business or property owner.

This electrical system requirement offers little benefit to unsophisticated owners uninterested in the minute detail of the energy consumption of their building. Owners that have concerns about their own energy consumption and related costs, will be interested in energy monitoring already but only to a level that matches their budgets. The requirements of this section are extremely costly to the initial construction, potentially by hundreds of thousands of dollars in addition to the additional design related costs.

A Code with an implementation cost to the building owner of this magnitude unrelated to Public

Safety should not be accepted without extensive debate and wide-eyed review by all effected parties. This Code section is nearly a copy of the California Energy Code (Title 24 Vol. 6) mandates, which started 15 years ago. Looking at the construction cost budget on projects I have been involved with for prisons, Highway Patrol buildings, City, County, and State government buildings, libraries, etc., have all been struggling with construction budget issues only being hampered by burdening mandates. This section of the Code is one of those mandates, reconfigured by the ICC using nearly identical language.

If a business chooses to be more energy conscious the proposed code change (deletion) will not prevent implementing a more stringent requirement on themselves. For other businesses that do not have the same environmental concerns there would be no penalty.

I have lived and worked in Phoenix all my life and am sorry to see this level of mandate even being considered for this great town. This is effectively an anti-business proposal. We are saying you don't know how to run your business; we know what is best for you. It would seem a deterrent rather than an invitation to come do business here. Maybe a little less big brother and more of, "Hey, we want to partner with you for your success."

If you are unaware, here are the impacts electrically:
• Energy meters (apart from the utility meters we already have available to us doing the same thing) for the power supplied to the site and all related buildings, electrical apparatus, site lighting. The power companies do not give out free power, so there is already a meter covering all this.
• Next, the energy usages are broken down into sub uses which each require sub-metering. See Table C405.13.2. This list out "Load Categories" as follows:Total HVAC Systems (so this is every AC unit, supply and exhaust fan, Energy Recovery Unit, boiler, Chiller, pump, water heating for space conditioning)
o Interior Lighting (All.)
o Exterior Lighting (All. Interestingly enough, we could calculate this with just the electrical site plan, the fixture data, and the hours of operation. What is the point of metering? Who is going to turn off the lighting to save energy over and above site security? Guarantee this will be reversed once the first crime spree occurs)
o Plug loads (These are all the receptacle devices you plug anything into 15-60 amp receptacles throughout the building. These loads are variable in the fact the items are "plugged" in and may or may not be there from one day to the next)
o Process Load. This is all the rest of the loads within the building that are not in the above categories, oh but exempted as long as it is below 5% of the total building peak connected load – what is this exactly? The NEC does not attempt to calculate this value and has multiple factors to increase and decrease loads to conclude what its compliance value should be. An example of this is the receptacle load that looks at each receptacle as 180 VA (watts essentially) of load and recognizes that not all receptacles are used. This metering requirement appears to introduce a new set of calculations that sums up all the loads that are in the building as the "connected load" and assumes all are on at once making up a "peak" load. (Certainly will never be more than that!).
o Building Operations and other misc. loads (essentially the elevators, escalators, automatic doors, motorized shades, fountains, pools, spas, fire places, snow melt systems are all included, but there could be more if you have them you will just know)
o Electrical hot water heating for uses other than space conditioning (but only if the electric water heater is rated greater than 10% of the building service rating, otherwise no)

As is made evident by this list, there are many segregations in the system that when implemented, dictate many meters. To minimize the metering challenges, the loads are typically grouped into the above categories to be metered by a single feeder with a meter on that supply. That can get you down to a (7) sub meters. Making it a total of (8) because you still need a main

system meter. Remember, the utility meter is not good enough here.

This differs from normal distribution in that there are usually larger panels feeding an area with sub panels supplied out of them into subsequent smaller areas. This is beneficial for load management and voltage drop management and has been the design style since the beginning of modern electrical distributions. Westinghouse published books on these concepts starting in the 1940's and the IEEE has enshrined distribution methods in their literature as well. To accomplish this metering requirement In C405.13 is no small feat. There will be additional panels needed to meet the required load segregation described for metering. You can't get around it. It is only a matter of how many you can avoid adding.

Looking at the only other current solution for load segregation involves metered breakers. This is a system that uses the traditional panel distribution methods and then applies a metering node to each breaker. The nodes are gathered into a common system and each node is assigned a load type corresponding to this aforementioned table. This is a metering system and normally is standalone apart from the Building Automation System. This, as you can imagine, is a high end system with a related high end expense. Yet at some point, it is more cost effective than adding a whole lot of panels.

In C405.13.3 Electrical Meters, it mentions the use of non-intrusive Load Monitoring (NILM) technology. In researching this technology, I found various documentation on the technology but no systems. It appears the US Dept of Energy Pacific Northwest National Laboratory was compiling data on the use of the technology up until 2016 where they were attempting to establish standards for the products to meet. It is unclear what this product's availability is. If, and when this technology comes to market, it appears to use electrical impulse and wave signatures in the power system to determine the type of equipment present. It uses this information to disaggregate the loads into each respective load type. In this case, there would not be a need for dedicated meters or metered breakers just several of these NILM devices applied at strategic points in the electrical distribution system to extract the data. This means it would be retrofittable system for any building.

Indirect effects of implementation:
• Increased Building Safety Department plan review time to assure design compliance addressing load segregations, load calculations for limitations, added panels, metering components.
• Increased Building Safety inspection time to assure actual compliance for load segregations, additional panels, and metering systems.
• Added complexity in building electrical systems creating an ongoing cost to the Owner. It is my opinion this decreases building safety by complications in power distribution.

Real world issues:
The presence of the metering systems does not mean they will be used for anything. I have seen such systems in place but when attempting to get data from the system for electrical analysis, it was unavailable, not working, or never set up to fully function or record data. These requirements to put in the sophisticated equipment are insufficient to get the results hoped for without the necessary follow up and ongoing maintenance. Unless the owner intends to use the system, it will likely be set aside shortly after installation. Any benefits that might be gained will be lost.

When the building owner wants to handle this level of sophisticated building management, they will higher facilities personnel with higher skill levels to accomplish it, or hire outside third parties to gather and manage the data. This is an ongoing operational cost to that building owner. As a result, it is a personal decision by that management team. Without this level of buy-in, there will be no ongoing implementation.

Rather than mandate this metering be part of the Owners program, it would be far more effective to allow the owner to do the math, determine the ROI for the particular system selected to meet their particular desired end, and implement that system. This section is full of too many mandates that drive design. This in turn drives up cost for everyone. At some point, we must ask ourselves, what is the purpose of this requirement? Can't economics drive the results instead of the City Codes?

Other considerations:
It has been the City policy, or practice, to ignore energy code related requirements from an electrical perspective relative to the purposes of plan review because they are not related to life safety. A permit is not to be held up for lack of compliance with an energy code element. If the policy remains, then the inspections department is going to be the one to assure compliance. This will add time to electrical building inspections and angsts with the construction teams as these items are ironed out after construction is well under way. Certainly, segregating loads into groups after the fact will be painful if not impractical or even impossible, not to mention locating metering equipment into tight electrical rooms.

If the policy is changed to require compliance be shown on the plans prior to permit issuance, plan review time will increase which effectively should require additional plan review fees for said services. An energy code deficient electrical plan submittal would be subject to delay if energy code compliance could hold up a plan approval. Generally, the controlled receptacle requirements are such that a plan reviewer will not be able to effectively add a comment on a drawing resolving a deficient plan, which is how minor deficiencies are presently handled to expedite the review process. If the energy code was not important enough to hold up a plan review today, why should it be in the future? It follows that if it is not important enough now to hold up a plan review, what is the point of adding more regulation that will not be implemented?

If it is the intention to require conformance to the proposed IECC, the following will be needed to properly implement this portion of the Energy Code:
• Additional personnel within the Building Safety Department of the City to meet the State mandated turn-around times.
• Additional training is needed for electrical plan reviewers related to what must be on the plans to meet the minimum conformance criteria.
• A published check list must be developed and published to the Design Community if there is any chance of attaining compliant design plans within the mandated plan review times.
• Possible solution would be to add an Energy Review team that solely reviewed IECC compliance and make it one of the disciplines equal to electrical, mechanical/plumbing, fire, building, structural.
• Possible similar solution with the Building Inspection teams.

Recommendation:
Strike 2024 IECC C405.13 from adoption based on the above arguments.
Striking this provision for metering has no effect on the plan review, inspections, or design community. It shows Phoenix is willing to maintain a logical approach to energy conservation while retaining a business friendly environment. It means there will be no related workload burden placed on the Electrical Plans Reviewers or Electrical Inspector. There will be no need for plan review fee increases to the public related to this issue.

Fall back option:
Make 2024 IECC C405.13 and "Optional Code" for Owners to follow, much like the Green Building Code of the past. It looks good to the non-discerning but has no real effect.

Staff Committee Rationale for Recommendation: The Committee thinks energy monitoring and automatic receptacle control requirements are expensive for the energy savings that will eventually be realized.

However, likewise and in comparison, the Committee thought similarly regarding LED lighting when it first came out, but the cost for LED lighting has dramatically decreased over time

See staff-modified version.

Cost Impact: Cost reductions to City Permitting and Inspections Departments as compared to adopting w/o proposed amendments.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:	
2024 Code Committee	Date: 01/16/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [RE], Section R402

Submitted by: Home Builders Association of Central Arizona

SECTION R402 BUILDING THERMAL ENVELOPE

TABLE R402.5.1.1 AIR BARRIER, AIR SEALING AND INSULATION INSTALLATION[a]

COMPONENT	AIR BARRIER CRITERIA INSULATION	INSTALLATION CRITERIA
Rim joists	Rim joists shall include an air barrier. ~~The junctions of the rim board to the sill plate and the rim board and the subfloor shall be air sealed.~~	Rim joists shall be insulated so that the insulation maintains permanent contact with the exterior rim board.

No changes to footnotes.

Justification: From NAHB - This amendment simplifies the provisions and allows the building designer the choice of selecting an air barrier based on the specific wall assembly design. Any air barrier at the rim will constitute an exterior air barrier because the rim is always located at the exterior of the structure. Having the additional word “exterior” can lead to misinterpretation that the air barrier always must be outboard of the rim joist’s exterior face. That was never the intent of the change that was approved for the 2021 and 2024 IECC as evidenced by the supporting reason statement that was included by the proponent of the change.

Examples of acceptable air barrier options that meet the intent of the code include (not an exhaustive list):

- Sealing the entire rim joist from the interior with closed-cell spray foam;
- Sealing the rim joist boundaries and joints with caulk from the interior;
- Taping or sealing the joints on the exterior face of the rim joist;
- Installing mechanically attached membrane (i.e., house wrap) taped at all seams and boundaries;
- Installing exterior rigid foam sheathing taped or sealed at all joints and boundaries;
- Installing a fluid-applied membrane on the exterior face of walls;
- Installing a peel-and-stick membrane on the exterior face of walls.

It is noted that a whole-building tightness test is required to verify the overall air tightness of the house.

Staff Committee Rationale for Recommendation: The staff modified version accomplishes what the applicant is requesting, without it appearing that sealing joints is not necessary**. See staff modified version for further information.**

Cost Impact: Applicant provided no information

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**	
ACTION TAKEN:	
2024 Code Committee	Date: 02/18/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [RE], Section R403

Submitted by: Home Builders Association of Central Arizona

SECTION R403 SYSTEMS

~~**R403.6.3 Testing.**~~
~~Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6, in accordance with ANSI/RESNET/ICC 380. Where required by the code official, testing shall be conducted by an approved third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the code official.~~

~~**Exceptions:**~~

1. ~~Kitchen range hoods that are ducted to the outside with ducting having a diameter of 6 inches (152 mm) or larger, a length of 10 feet (3028 mm) or less, and not more than two 90-degree (1.57 rad) elbows or equivalent shall not require testing.~~
2. ~~A third-party test shall not be required where the ventilation system has an integrated diagnostic tool used for airflow measurement, and a user interface that communicates the installed airflow rate.~~
3. ~~Where tested in accordance with Section R403.6.4, testing of each mechanical ventilation system is not required.~~

Justification:
From NAHB - Ventilation systems should be installed in accordance with the mechanical provisions of Chapters 15 and 16 of the IRC and the manufacturer's installation instructions. Where both are followed, high performance will be achieved without the need for testing and the associated cost. The focus should be on achieving compliance with the mechanical code provisions such as proper fan air flow rating, fan efficacy, maximum duct length, number of elbows, and duct sealing.

Staff Committee Rationale for Recommendation: Minimum ventilation flow rates are an important quality of life and life safety item and should be tested.

Cost Impact: No data provided by the applicant.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee Date: 02/18/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken

Development Advisory Board (DAB) Subcommittee Date: 03/06/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied ☐ No action taken

Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [RE], Section R404

Submitted by: Home Builders Association of Central Arizona

R404 ELECTRICAL POWER, LIGHTING AND RENEWABLE ENERGY SYSTEMS

R404.1 Lighting equipment. ~~All~~ Not less than 90 percent of the permanently installed luminaires shall be capable of operation with an efficacy of not less than 45 lumens per watt or shall contain lamps capable of operation with an efficacy of not less than 65 lumens per watt.

Exceptions:

1. Appliance lamps
2. Antimicrobial lighting used for the sole purpose of disinfecting
3. General service lamps complying with DOE 10 CFR, Part 430.32
4. Luminaires with a rated electric input of not greater than 3.0 watts

Justification: From NAHB - A small 10% allowance for lighting sources that do not meet the new definition of High-Efficacy Lamps (65 lumens per watt) is restored to allow design flexibility.

Staff Committee Rationale for Recommendation: City of Phoenix is a leader in energy efficiency without compromising safety. This amendment would make code enforcement more difficult and could possibly raise City costs to enforce.

Cost Impact: Applicant provided no information.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 02/11/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025
☐ Approved as submitted ☐ Modified and approved ☒ Denied	☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken
City Council Action	Date:
☐ Approved as submitted ☐ Modified and approved ☐ Denied	☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [RE], Section R404

Submitted by: Home Builders Association of Central Arizona

R404 ELECTRICAL POWER, LIGHTING AND RENEWABLE ENERGY SYSTEMS

~~**R404.2 Interior lighting controls.** All permanently installed luminaires shall be controlled as required in Sections R404.2.1 and R404.2.2.~~

~~**Exception**: Lighting controls shall not be required for safety or security lighting.~~

Justification: The provision for interior lighting controls are removed for the following reasons:

- The language allows "manual control" which can be a simple on/off switch.
- With the requirement for high-efficacy lamps, adding controls does not result in significant energy savings.
- Occupancy sensors can be disruptive to the occupant.
- Dimmers and sensors, which primarily address lifestyle preferences, should remain a design option.

Staff Committee Rationale for Recommendation: The staff proposal for this same section accomplishes the same thing as applicant's proposal.

Cost Impact: Applicant provided no information.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	Date: 02/11/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB) Subcommittee	Date: 03/06/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Development Advisory Board (DAB)	Date: 04/22/2025	
☐ Approved as submitted	☐ Modified and approved	☒ Denied ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken
City Council Action	Date:	
☐ Approved as submitted	☐ Modified and approved	☐ Denied ☐ No action taken

City of Phoenix
PLANNING & DEVELOPMENT DEPARTMENT

BUILDING CONSTRUCTION CODE CHANGE PROPOSAL

Amendment to 2024 International Energy Conservation Code (IECC)
Chapter 4 [RE], Section R406

Submitted by: Home Builders Association of Central Arizona

SECTION R406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

TABLE R406.5
MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX	ENERGY RATING INDEX WITH OPP
0 and 1	51	35
2	57 ~~51~~	34
3	50	33
4	53	40
5	54	43
6	53	43
7	52	46
8	52	46

Justification: From HBACA - This amendment restores the ERI threshold to the 2018 IECC levels.

From NAHB - There was no justification or cost analysis provided for this change during the IECC code development process.

The City of Chandler recently adopted the 2024 IECC and maintained the energy rating index at 57, which is considered extremely energy efficient.

Staff Committee Rationale for Recommendation: The current average score last year was 53, and with the new requirements and industry standards in windows, walls, and insulation, 51 should be easily attainable.

Cost Impact: Applicant provided no information.

Approved in previous 2018 Code Adoption process: ☐ **YES** ☒ **NO**

ACTION TAKEN:

2024 Code Committee	☐ Approved as submitted	☐ Modified and approved	☒ Denied	Date: 02/11/2025 ☐ No action taken
Development Advisory Board (DAB) Subcommittee	☐ Approved as submitted	☐ Modified and approved	☒ Denied	Date: 03/06/2025 ☐ No action taken
Development Advisory Board (DAB)	☐ Approved as submitted	☐ Modified and approved	☒ Denied	Date: 04/22/2025 ☐ No action taken
Transportation, Infrastructure and Planning Subcommittee	☐ Approved as submitted	☐ Modified and approved	☐ Denied	Date: ☐ No action taken
City Council Action	☐ Approved as submitted	☐ Modified and approved	☐ Denied	Date: ☐ No action taken