# PC1– 13
## 501.4 (New), 501.4.1 (New)

**Proponent:** Michael Mahoney, Federal Emergency Management Agency, representing the National Earthquake Hazards Reduction Program
(mike.mahoney@fema.dhs.gov)

**Add text as follows:**

**501.4 Acceptable Methods.** The following methods are considered acceptable methods to comply with Section 501.3.

**501.4.1 Seismic Performance Assessment Methodology.** Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Section 501.3 of this code.

**Add new standards as follows:**

**CHAPTER 23**

**REFERENCED STANDARDS**

FEMA P-58- January 2013, Seismic Performance Assessment of Buildings

**Reason:** This new method is being introduced to provide further guidance on performance based design for seismic loads. It introduces and is based on a new seismic performance assessment methodology developed for the Federal Emergency Management Agency (FEMA) under contract with the Applied Technology Council (ATC).

This document introduces a seismic performance assessment methodology as well as the basic building information, response quantities, fragilities, and consequence data that are used as inputs to the methodology. The procedures are probabilistic, uncertainties are explicitly considered, and performance is expressed as the probable consequences, in terms of human losses (deaths and serious injuries), direct economic losses (building repair or replacement costs), and indirect losses (repair time and unsafe placarding) resulting from building damage due to earthquake shaking. The methodology is general enough to be applied to any building type, regardless of age, construction or occupancy; however, basic data on structural and nonstructural damageability and consequence are necessary for its implementation. To allow for practical implementation of the methodology, this product also includes fragility and consequence data for most common structural systems and building occupancies, and an electronic *Performance Assessment Calculation Tool* (PACT) for performing the probabilistic computations and accumulation of losses.

Historically , direct references in this document to design standards have been avoided but as performance design standards emerge it is becoming more important to link these methods and standards with the performance code. Therefore it has been proposed to create a new section in Chapter 5 titled acceptable methods. This same structure could occur in all chapters as these performance based methods are developed and will give a clear quantitative way to comply with this code. Alternatively, at a minimum an appendix should be developed to house these methods so code users can more directly link to quantitative tools.

**Appendix C – Structural Acceptable Methods**

**Section C101**
**Scope**

**C101.1 General.** This appendix provides acceptable methods for compliance with Chapter 5 of this code.

**C102**
**SEISMIC DESIGN**.

**C102.1 Seismic Performance Assessment Methodology.** Application of the seismic performance assessment methodology in FEMA P-58, including the Performance Assessment Calculation Tool (PACT) contained therein, shall be considered an *acceptable method* for compliance with the seismic provisions of Chapter 5 of this code.

**Section C103**

**REFERENCED STANDARDS**

FEMA P-58- January 2013, Seismic Performance Assessment of Buildings

**Cost Impact:** Not applicable

**Analysis:** A review of the standard proposed for inclusion in the code FEMA P 58 – January 2013 titled Seismic Performance Assessment of Buildings , with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

**PC1-13**

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| Public Hearing: | Committee: | AS | AM | D |
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APP F (NEW)-PC-MAHONEY.DOC

# PC2-13
## 1501.2, 1501.3.1, 1501.3.2,1501.4 (New)

**Proponent (email):** Ryan M. Colker, National Institute of Building Sciences representing National Institute of Building Sciences; Ryan Meres, Institute for Market Transformation, representing Institute for Market Transformation; Greg Towsley,Grundfos, representing Grundfos; Kurt Riesenberg, Spray Polyurethane Foam Alliance, representing Spray Polyurethane Foam Alliance (rcolker@nibs.org)

**Revise as follows:**

**SECTION 1501**
**ENERGY EFFICIENCY**

**1501.1 Objective.** To facilitate efficient use of energy.

**1501.2 Functional statement.** Buildings shall ~~have provisions ensuring~~ ensure efficient use of ~~nonrenewable~~ energy.

**1501.3 Performance requirements.**

**1501.3.1 Energy performance indices.** To provide for the efficient use of ~~depletable~~ energy ~~sources~~, the building envelope and all other building systems impacting energy use including but not limited to mechanical, plumbing and electrical shall be designed and constructed within stated parameters either individually or as a system. These parameters are called the energy performance indices. These indices are the amount of energy ~~from a depletable energy source passing through~~ entering a specified building ~~envelope area~~ or facility during a specified ~~difference in internal and external temperature~~ period of time. These indices are based on the geographic location and ~~region of the country as well as~~ the use of the building. Equivalent energy performance utilizing alternative energy conservation techniques is permitted. In some cases, for certain types of buildings, the local jurisdiction has the authority to choose not to specify energy performance indices.

~~**1501.3.2 Temperature control.** For buildings requiring a controlled temperature, the building design and construction shall take into account various factors. Normally, only insulation, types of windows and related building elements are considered when addressing energy conservation. However, to provide for the efficient use of energy, there are several other items that need to be taken into consideration, such as thermal resistance, solar radiation, air tightness and heat gain or loss from building services.~~

**1501.4 Acceptable Methods.** The following methods are considered acceptable methods to develop and demonstrate compliance with energy performance indices in Section 1501.3

**1501.4.1 Development of indices.** In determining the energy performance indices for a building or facility, the following factors shall be used by the authority having jurisdiction:

1. The principal purpose or function of the building or facility;
2. The length of time the building or facility is normally occupied by people;
3. The number of persons normally occupying, visiting, employed in or otherwise using the building, facility or portion of the building or facility
4. The energy use of similar buildings or systems based on occupancy and climate.

5. Anticipated energy use of a building or facility of the same classification in accordance with the latest edition of the *International Energy Conservation Code* or *International Green Construction Code*.

~~6.~~ The energy use data characterizing a defined stock of buildings relevant to region and the building types being addressed shall be reviewed,

**1501.4.2 Establishment of Indices.** The energy performance indices shall be established in accordance with Section 1501.4.2.1 or 1501.4.2.2.

**1501.4.2.1 Jurisdiction-wide indices.** The adopting entity shall establish acceptable indices for all similar buildings covered under this code.

**1501.4.2.2 Project-specific indices.** The adopting entity shall establish acceptable indices for each individual building or facility to meet.

**1501.4.3 Methodology for Compliance.** Compliance with the energy indices shall comply with Section 1501.4.3.1 through 1501.4.3.9.

**1501.4.3.1 Pre-Occupancy.** The expected energy use of the building shall be less than or equal to that determined in accordance with Section 1501.4.1 and 1501.4.2.

**1501.4.3.2 Energy Model.** The design team shall develop a whole building energy model using software and parameters approved by the code official. ASHRAE 105 and ASHRAE 140 shall be approved methods used in the development of whole building energy models.

**1501.4.3.3 Design Submittal.** Results of the model and cut sheets of equipment and characteristics contained within the compliant model developed under Section 1501.4.3.2 shall be provided to the code official in accordance with Section 103.3.5. The design team shall determine the expected energy use of the building in accordance with ASHRAE 105.

**1501.4.3.4 Permits and Inspections.** Permits and inspections shall be based on matching the equipment and characteristics contained in the compliant model under Section 1501.4.3.2 and design report under Section 103.3.4.2.2 with the plan and on-site as required in Section 103.3.6 and Section 103.3.7.

**1501.4.3.5 Verification of Compliance Documentation.** The design team shall submit documentation verifying compliance with the established bounding conditions in accordance with Section 103.3.8.1.

**1501.4.3.6 Issuance of Certificate.** The code official is authorized to issue a "Conditional certificate of occupancy" in accordance with Section 103.3.9.1.3 for a time period determined sufficient to demonstrate achievement of the outcome requirement.

**1501.4.3.7 Post-Occupancy.** The actual energy use of the building shall not be greater than that determined in accordance with Section 1501.4.1 and 1501.4.2.

**1501.4.3.8 Reporting of Energy Use.** An annual report of energy use is required to be provided by the building owner to the code official in accordance with Section 103.3.10.2 and Section 103.3.10.3.

**1501.4.3.9 Violations and Penalties.** If the building's energy use as reported in accordance with Section 1501.4.3.8 is deemed noncompliant, the adopting entity is authorized to determine appropriate penalties in accordance with Section 103.2.10, Section 103.3.10.2, Section103.3.10.3, and Section 103.3.12. The actual penalties shall be set by the jurisdiction in accordance with Section103.3.13.4.

**Add new standards as follows:**

## CHAPTER 23

## REFERENCED STANDARDS

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| **ASHRAE** | American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle Atlanta, GA 30329-2305 |
| **ASHRAE 105-2007** | Standard Methods of Expressing, and Comparing Building Energy Performance |
| **ASHRAE 140—2007** | Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs |

**Reason:**

1. There is increasing interest in focusing on actual energy performance of buildings. This is in direct contrast to the current focus by energy codes on building and component design (primarily based on prescriptive requirements) with no requirements for ongoing performance and associated measurement and verification. They also have not generally looked at the building as a whole, other than the ability to adjudge a building based on how an energy simulation predicts it will perform against a clone of itself that is based on the prescriptive requirements.
2. The ICCPC is clear and serves as an appropriate code for inclusion of an outcome-based approach for energy. An approach consistent with the intent of the ICCPC is needed to foster the ability to look at the building as a whole, assess its anticipated performance in the design stage and then confirm delivery of an energy efficient building based on the actual energy use of the building.
3. Software and other tools exist that allow for the accurate modeling of building energy use to predict how a building will perform. Resources included within the ICCPC are §104.2.1: Approved methodologies, Appendix C: Individually Substantiated Design Method and Appendix E: Use of Computer Models. Guidance from the Department of Energy, ASHRAE Standard 105 and ASHRAE 140 and ComNet also may be used.
4. Data exist that provide a basis for accurately stipulating how buildings should perform (e.g. setting annual Energy Use Indices) including the Energy Information Administration Commercial Buildings Energy Consumption Survey and the U.S. Department of Energy/Environmental Protection Agency EnergyStar Program.
5. It is now feasible and more realistic to stipulate how buildings should be designed and constructed in order to yield a certain performance level and be evaluated for compliance with that level.
6. It is also now feasible and more appropriate to also assess how buildings actually perform against an established EUI.
7. The primary challenges currently identified for achievement of outcome-based energy performance include the methodology for setting outcomes, the role of code departments and others in monitoring and enforcing the outcome requirements, the fit within existing energy codes and standards, recourse for non-compliance, and contracting mechanisms for implementing such policies. This proposal is intended to establish optional, code-based criteria for establishment of an outcome-based methodology.
8. The proposal leaves open the opportunity to have post-occupancy compliance conducted by entities outside the code department.

**Cost Impact:** This code change proposal will not increase the cost of construction.

**Analysis:** A review of the standard proposed for inclusion in the code ASHRAE 105-2007, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013. The standard ASHRAE 140 -2007 is currently referenced in the IECC.

**PC2-13**

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| Public Hearing: | Committee: | AS | AM | D |
| | Assembly: | ASF | AMF | DF |

# PC3-13
## Section 1501.4 (New)

**Proponent:** Jim Edelson, representing New Buildings Institute
(jedelson@comcast.net)

**Add text as follows:**

**1501.4 Acceptable Methods.** The following methods are considered acceptable methods to satisfy the performance requirements in Section 1501.3.

**1501.4.1 Outcome based compliance.** The measurement of actual energy used to demonstrate compliance with Section 1501.3 shall be in accordance with Sections 1501.4.1.1 through 1501.4.1.4.

**1501.4.1.1 Calculations.** All energy usage shall be converted into units consistent with the energy units established by Section 1501.3.1.

**1501.4.1.2 Certificate of Occupancy.** Prior to the issuance of the certificate of occupancy and upon completion of construction, the *building* owner shall submit an operational plan to the *authority having jurisdiction* that includes the certification of the owner and an architect, engineer or general contractor under contract to the owner for monitoring and reporting energy use over a continuous 12-month period. The plan shall include the method for reporting actual energy use of the *building* in the format of the energy performance indices established by Section 1501.3.1.

**1501.4.1.3 Occupancy. T**he metered, measured or billed energy use of the building shall be apportioned based on the occupancy period and square footage of the actual occupancy of the building during the 12-month period of monitoring energy use. Where multiple tenants or multiple occupancies exist, their tenancy or occupancy in the building shall be attested to by an affidavit signed by all building tenants indicating the time periods and square footage of the building portion occupied.

**1501.4.1.4 Certificate of Acceptance.** An application for Certificate of Acceptance is required to be filed with the *authority having jurisdiction* within 36 months of receiving a final Certificate of Occupancy. The application for the Certificate of Acceptance shall indicate that the owner and an architect, engineer or general contractor under contract to the owner have determined that the building has met the performance requirement established by Section 1501.3.1. Upon receipt of the completed application, a Certificate of Acceptance shall be provided to the building owner.

**Reason:** Since the first energy codes, compliance has not been based on actual building performance but rather on tried and true means of improving the performance of buildings: more insulation, better windows, better equipment, more efficient lighting, etc. This effectively made the goal of energy codes to create more efficient buildings rather than to create buildings that attain a certain level of efficiency. This current method of compliance leaves a whole range of factors that impact energy efficiency, from design to occupancy, unaddressed and unregulated by the code. In the design phase, these factors include orientation, system selection, passive characteristics, etc. In the occupancy phase, these factors include control strategies, occupant density, equipment maintenance, plug loads, etc.

The result is a misalignment between the energy codes and how buildings actually perform. Not only does this leave a large portion of building energy use unaddressed, it means that many very effective means of achieving energy efficiency, especially many new technologies, cannot be used to achieve code compliance. As technologies become more complex, and the 'unregulated' portions of building energy use increase, the traditional prescriptive-based energy codes will become less and less able to impact the actual energy performance of buildings. The significant increases in stringency contained in the 2012 version of the International Energy Conservation Code accelerated the pace at which this is occurring.

The ICC Performance Code is formulated around a concept of flexibility. Rather than prescribing the details that lead to a desired outcome, the ICCPC requires a desired performance – a desired outcome – and then provides flexibility as to how that outcome is reached. This makes it a natural fit for an approach to energy efficiency that uses actual outcomes rather than performance proxies (insulation levels, equipment efficiency, etc.) to demonstrate compliance.

In section 1501.3.1, the ICCPC already contains a mechanism that allows jurisdictions to set performance targets. This proposal adds a new section 1501.4 that allows projects to demonstrate compliance with those performance targets through the measurement of actual energy performance. The outcome-based compliance option relies upon actual measurement of the

performance of a building after it is occupied and fully operational. Only then can the owner be fully cognizant of the true energy costs and possibilities for management of the use and application of energy savings.

A certificate of occupancy is necessary to allow the building to be occupied despite the fact that outcome-based compliance has not been determined, and cannot be determined. Responsibility for monitoring and recording the energy used and energy produced by the building and the building site falls to the design team, including the owner, architect, engineer and even contractors. They are all part of the process of preparing an operational plan that indicates the measurement methodology and how they intend to comply with the performance target set in 1501.3.

Occupancy factors for the actual tenants are required to be factored into the calculation of energy consumption if there are multiple tenants in a building. With at least a full year of testing and evaluation of the building performance, the team can determine whether the results meet the anticipated goal. The compliance path sets a period of 36 months in which to demonstrate compliance. This 3-year period permits time to allow for the building to become as fully occupied as possible and to come up to speed with the operational features. This will also give the design team sufficient time to modify and adjust the various key elements of the building that are affecting the building's energy consumption.

Finally, there is documentation submitted to the jurisdiction for a certificate of acceptance. The design team provides the information that has been gathered in accordance with their procedures and it only requires that the documentation be entered into the building project record. The owner simply gets a Certificate of Acceptance indicating this step in the process has been completed. While this process provides only a promise that the building will perform, this is not different from the method of determining compliance with the computer simulation approach that is already in almost every energy code.

This proposal does not require that all buildings demonstrate compliance with the ICCPC by using actual energy outcomes. The permissive language only makes the proposed option available for those projects that desire it. It closes the gap between the code and actual energy outcomes, and brings the full range of factors that impact energy performance as an option into the ICCPC.

**Cost Impact:** There is no cost impact to this proposal.

**PC3-13**

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| Public Hearing: | Committee: | AS | AM | D |
| | Assembly: | ASF | AMF | DF |

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# PC4-13
## 1901.3.2, 1901.3.10

**Proponent:** Mark Watson, IntPE, Ecoglo International Ltd, representing Ecoglo International Ltd. (mark.watson@ecoglo.com)

**Revise as follows:**

**1901.3.2 Identification, ~~illumination~~ visibility and safety of means of egress.** Means of egress shall be clearly identified, ~~provided with adequate illumination~~ be made adequately visible and be easy and safe to use.

**1901.3.10 Maintenance of ~~illumination~~ visibility.** Means of egress shall be maintained and operated in such a manner to ensure adequate ~~lighting~~ means for providing visibility to facilitate safe egress is available.

**Reason:** The use of the word "illumination" rather than "visibility" discourages the use of alternative solutions, which is contrary to the purpose of the ICC PC [Section 101.1 Purpose: "To provide appropriate health, safety, welfare, and social and economic value, while promoting innovative, flexible and responsive solutions that optimize the expenditure and consumption of resources."] Alternative solutions such as systems using electrical or photoluminescent path markings can make the means of egress adequately visible without illumination of the means of egress. Illumination infers the casting of light onto a surface or object. It depends on the properties of that object how much light (if any) is reflected or emitted to be detected by our eyes. "Visibility" requires that the object is detected by our visual system, and therefore is the critical performance indicator.

**Cost Impact:** The code change proposal will not increase the cost of construction.

**PC4-13**

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| Public Hearing: | Committee: | AS | AM | D |
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