



# CITY OF CAÑON CITY

## Building Department

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## 2018 International Residential Energy Conservation Code. Energy Conservation Design, Submittal, Inspection, and Compliance.

The City of Cañon City Building Department has adopted the 2018 International Residential Energy Conservation Code, effective January 1, 2021. All references to the energy code requirements are in the 2018 International Residential Code under Chapter 11. This handout will summarize the new submittal requirements for energy code compliance. This applies to building permits for all new residential projects, including detached one-and-two family homes, townhomes, and multi-family projects (R-2, R-3 and R-4) not more than three stories above grade plane.

IRC Chapter 11 Section N1103 Systems. Requirements for HVAC systems and mechanical ventilation systems. Please see table below for ACCA Manual J design requirements for Cañon City, Colorado.

MANUAL J DESIGN CRITERIA <sup>a</sup>						
Elevation	Altitude correction factor <sup>b</sup>	Coincident wet bulb	Indoor winter design relative humidity	Indoor winter design dry-bulb temperature	Outdoor winter design dry-bulb temperature	Heating temperature difference
5332	0.83	59°	30%	70°	5°	65°
Latitude	Daily range	Summer design grains	Indoor summer design relative humidity	Indoor summer design dry-bulb temperature	Outdoor summer design dry-bulb temperature	Cooling temperature difference
38	H	-33 to -48	50%	75°	94°	19°

There are three design paths that the designer can take to show compliance with the energy code. Option #1 is the Prescriptive Path per IRC Chapter 11 Section N1102; Option #2 is the Simulated Performance Alternative Path per IRC Chapter 11 Section N1105; and Option #3 is the Energy Rating Index Compliance Alternative per IRC Chapter 11 Section N1106.

### OPTION #1 – PRESCRIPTIVE PATH

IRC Chapter 11 Section N1102 has the requirements for the prescriptive path. The plans need to show the following information. All information shall be per tables within Chapter 11 using Climate Zone 5.

1. **Building Thermal Envelope per Section N1102.1 through N1102.1.5.** Provide all the exact location of the building thermal envelope. Information shall be delineated on the plans, details, and section views. (Within the prescriptive path there are three alternatives N1102.1.2 Insulation and fenestration criteria, N1102.1.4 U-factor alternative and N1102.1.5 Total UA alternative which is REScheck).
2. **Specific Insulation Requirements per Section N1102.2.** Provide all insulation “R” values, materials, and locations to be installed (walls, ceilings, cantilever floors, floors over garage, crawl space, basement walls, etc.) per Section N1102.2.1 through N1102.2.13 and Table N1102.1.2.

3. **Fenestration per Section N1102.3.** Provide all fenestration U factors per Section N1102.3.1 through N1102.3.5 and Table N1102.1.2. This will apply for all glazing in windows, skylights and doors.
4. **Air Leakage per Section N1102.4.** Provide details on how all areas listed in Sections N1102.4.1 through N1102.4.5 will be accomplished. Including N1102.4.1.2 Testing. (Blower door test)

## **OPTION #2 – SIMULATED PERFORMANCE ALTERNATIVE**

This option is available per IRC Chapter 11 Section N1105. Please be aware that Section N1105.2 also requires compliance with the mandatory requirements of Sections N1101.13 be met.

### **N1101.13 (R401.2) Compliance.**

Projects shall comply with one of the following:

1. Sections N1101.14 through N1104.
2. Section N1105 and the provisions of Sections N1101.14 through N1104 indicated as “Mandatory.”
3. The energy rating index (ERI) approach in Section N1106.

### **N1105.4.2 (R405.4.2) Compliance report.**

Compliance software tools shall generate a report that documents that the proposed design complies with Section N1105.3. A compliance report on the proposed design shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based on the as-built condition of the building shall be submitted to the building official before a certificate of occupancy is issued. Batch sampling of buildings to determine energy code compliance shall only be allowed for stacked multiple-family units.

Compliance reports shall include information in accordance with Sections N1105.4.2.1 and N1105.4.2.2. Where the proposed design of a building could be built on different sites where the cardinal orientation of the building on each site is different, compliance of the proposed design for the purposes of the application for the building permit shall be based on the worst-case orientation, worst-case configuration, worst-case building air leakage and worst-case duct leakage. Such worst-case parameters shall be used as inputs to the compliance software for energy analysis.

#### **N1105.4.2.1 (R405.4.2.1) Compliance report for permit application.**

A compliance report submitted with the application for building permit shall include the following:

1. Building street address, or other building site identification.
2. A statement indicating that the proposed design complies with Section N1105.3.
3. An inspection checklist documenting the building component characteristics of the proposed design as indicated in Table N1105.5.2(1). The inspection checklist shall show results for both the standard reference design and the proposed design with user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section N1105.3.
5. The name of the individual performing the analysis and generating the report.
6. The name and version of the compliance software tool.

#### **N1105.4.2.2 (R405.4.2.2) Compliance report for certificate of occupancy.**

A compliance report submitted for obtaining the certificate of occupancy shall include the following:

1. Building street address, or other building site identification.
2. A statement indicating that the as-built building complies with Section N1105.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and indicating the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section N1105.3.
5. The name of the individual performing the analysis and generating the report.
6. The name and version of the compliance software tool.

**N1105.4.3 (R405.4.3) Additional documentation.**

The building official shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the standard reference design.
2. A certification signed by the builder providing the building component characteristics of the proposed design as given in Table N1105.5.2(1).
3. Documentation of the actual values used in the software calculations for the proposed design.

**OPTION #3 –ENERGY RATING INDEX COMPLIANCE ALTERNATIVE****N1106.1 (R406.1) Scope.**

This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis.

**N1106.2 (R406.2) Mandatory requirements.**

Compliance with this section requires that the provisions identified in Sections N1101.13 through N1104 indicated as “mandatory” and in Section N1103.5.3 be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficients in Table 402.1.1 or 402.1.3 of the 2009 International Energy Conservation Code.

**Exception:** Supply and return ducts not completely inside the building thermal envelope shall be insulated to an R-value of not less than R-6.

**N1106.3 (R406.3) Energy rating index.**

The Energy Rating Index (ERI) shall be determined in accordance with RESNET/ICC 301 except that the ERI reference design ventilation rate shall be in accordance with Equation 11-1.

Ventilation rate, CFM = (0.01 x total square foot area of house) + [7.5 x (number of bedrooms + 1)]  
**(Equation 11-1)**

Energy used to recharge or refuel a vehicle used for transportation on roads that are not on the building site shall not be included in the ERI reference design or the rated design.

**N1106.4 (R406.4) ERI-based compliance.**

Compliance based on an ERI analysis requires that the rated design be shown to have an ERI less than or equal to the appropriate value indicated in Table N1106.4 when compared to the ERI reference design.

**TABLE N1106.4 (R406.4)  
MAXIMUM ENERGY RATING INDEX**

CLIMATE ZONE	ENERGY RATING INDEX <sup>a</sup>
1	57
2	57
3	57
4	62
5	61
6	61
7	58
8	58

- a. Where on-site renewable energy is included for compliance using the ERI analysis of Section N1106.4, the building shall meet the mandatory requirements of Section N1106.2, and the building thermal envelope shall be greater than or equal to the levels of efficiency and SHGC in Table N1102.1.2 or Table N1102.1.4.

**N1106.5 (R406.5) Verification by approved agency.**

Verification of compliance with Section N1106 shall be completed by an approved third party.

**N1106.6 (R406.6) Documentation.**

Documentation of the software used to determine the ERI and the parameters for the residential building shall be in accordance with Sections N1106.6.1 through N1106.6.3.

**N1106.6.1 (R406.6.1) Compliance software tools.**

Software tools used for determining ERI shall be Approved Software Rating Tools in accordance with RESNET/ICC 301.

**N1106.6.2 (R406.6.2) Compliance report.**

Compliance software tools shall generate a report that documents that the ERI of the rated design complies with Sections N1106.3 and N1106.4. The compliance documentation shall include the following information:

1. Address or other identification of the residential building.
2. An inspection checklist documenting the building component characteristics of the rated design. The inspection checklist shall show results for both the ERI reference design and the rated design, and shall document all inputs entered by the user necessary to reproduce the results.
3. Name of individual completing the compliance report.
4. Name and version of the compliance software tool.

**Exception:** Where an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four (north, east, south and west) cardinal orientations.

**N1106.6.3 (R406.6.3) Additional documentation.**

The code official shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the ERI reference design.
2. A certification signed by the builder providing the building component characteristics of the rated design.
3. Documentation of the actual values used in the software calculations for the rated design.

**N1106.6.4 (R406.6.4) Specific approval.**

Performance analysis tools meeting the applicable sections of Section N1106 shall be approved. Documentation demonstrating the approval of performance analysis tools in accordance with Section N1106.6.1 shall be provided.

**N1106.6.5 (R406.6.5) Input values.**

Where calculations require input values not specified by Sections N1102, N1103, N1104 and N1105, those input values shall be taken from RESNET/ICC 301.

**REQUIRED INSPECTIONS BY THE CAÑON CITY BUILDING DEPARTMENT****At rough frame inspection:**

Sealing of all plates and penetrations  
Air Barrier assemblies  
Verification of window stickers

**At Insulation Inspection:**

Insulation Installation  
Vapor Retarder

**POST A PERMANENT CERTIFICATE PER N1101.14 (POST BEFORE FINAL INSPECTION)**

**N1101.14 (R401.3) Certificate (Mandatory).**

A permanent certificate shall be completed by the builder or other approved party and posted on a wall in the space where the furnace is located, a utility room or an approved location inside the building. Where located on an electrical panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall indicate the predominant R-values of insulation installed in or on ceilings, roofs, walls, foundation components such as slabs, basement walls, crawl space walls and floors, and ducts outside conditioned spaces; U-factors of fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing performed on the building. Where there is more than one value for each component, the certificate shall indicate the value covering the largest area. The certificate shall indicate the types and efficiencies of heating, cooling and service water heating equipment. Where a gas-fired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall indicate "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be indicated for gas-fired unvented room heaters, electric furnaces and electric baseboard heaters.

**REQUIRED BLOWER DOOR TESTING TO BE PROVIDED BEFORE FINAL CO**

**N1102.4.1.2 (R402.4.1.2) Testing.**

The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding five air changes per hour in Climate Zones 1 and 2, and three air changes per hour in Climate Zones 3 through 8. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). Where required by the building 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 building official. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.