City of Boulder

The Rental Housing License Handbook

+ SmartRegs Guidebook

JANUARY 2016

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APPLY FOR A NEW LICENSE

Quick Notes

Applying for a NEW Rental License

A new rental license is required for rental property that has never been licensed before, a rental property whose previous license has expired for more than 90 days and rental property that has undergone a transfer of ownership (see exception noted below)

1. Obtain rental license application information by reviewing the materials in this handbook or by printing all relevant forms at bouldercolorado.gov/plan-develop/applications. You may also call 303.441.3152 or visit the Planning and Development Services Center located at 1739 Broadway, Third Floor.

2. Schedule an appointment for a baseline inspection with a private inspection contractor.

3. Complete the application packet. Note: Property owners not residing in Boulder County must appoint a local agent within 60 minutes of the property. Complete one application per single dwelling unit OR one application per each multi-unit building.

- ☐ **Completed Rental Housing License Application** (Found on page 4)
- ☐ **License Fee Payable to City of Boulder** License fee is $105 per single dwelling unit OR $105 per building for multi-unit buildings.
- ☐ **Completed Baseline Inspection Compliance Verification Forms:** Including the Smoke and Carbon Monoxide Alarm Verification, Trash Removal Verification, SmartRegs Verification and the multi-dwelling unit drawing for buildings with more than 1 dwelling unit. The first two pages must be completed and signed by a licensed rental housing inspector and the remaining pages should be completed and signed by the owner or agent. (Found on pages 5-7a)
- ☐ **Affidavit of Legal Residency:** State law requires the City of Boulder to verify that applicants obtaining certain public benefits are lawfully present in the United States. The verification process has three stages:
  A. The owner shows a form of identification as detailed on the affidavit form. (Found on page 8)
  B. The owner completes an affidavit.
  C. For non-citizens, the city verifies the owner is lawfully present through the SAVE program. See Affidavit of Legal Residency form.

4. Make copies of all forms for your records.

5. Submit all forms together as a complete packet: Incomplete packets will be returned to the applicant. Mail or deliver required items (application, fee, signed inspection compliance verification form, and Affidavit of Legal Residency) to:

Planning and Development Services c/o Rental Licensing Program
1739 Broadway, Third Floor
P. O. Box 791
Boulder, Colorado 80306

6. A copy of the rental license certificate will be mailed to you and is valid for four years or until the property is sold. Properties that have not met SmartRegs compliance at the time of application will expire on December 31, 2018.

Exception: Transfer of ownership does not include situations in which a rental property is transferred from ownership by one or more individuals into a limited liability company form of ownership if all three of the following apply: 1. At least one transferring owner is a member of the LLC; 2. No exchange of consideration takes place as a condition of the transfer; 3. Transferring owners certify that there is no significant change in the persons who are responsible for managing the property.

Rental Housing License Application

(Please submit a $105.00 fee with application. Make checks payable to "City of Boulder")

Rental Property Address Unit/Apt. # Zip Code

Number of Dwelling Units _____

Number of Rooming Units _____ Number of Bedrooms_____

Building Type (Check One):
Properties with more than 1 dwelling unit must include a map/drawing of the property indicating which unit(s) are rentals.

☐ Single Family Dwelling ☐ Condominium ☐ Apartment Building ☐ Manufactured/Mobile Home

☐ Duplex ☐ Tri-Plex ☐ Four-Plex ☐ Fraternity ☐ Sorority ☐ Bed & Breakfast ☐ Townhome

☐ Single Family Dwelling with Accessory Unit (must also be permitted through P&DS; call 303.441.1880 for more info)

Complex Name (if applicable)_____

PROPERTY OWNER: *required fields

First Name* Middle Initial Last Name*

Address* City/State* Zip Code

Primary Phone* Secondary Phone E-mail Address*

LOCAL AGENT: A property owner who does not reside in Boulder County shall appoint a person who lives in Boulder County to serve as the local agent of the owner. B.R.C. 1981, Section 10-3-14.

First Name Middle Initial Last Name

Address City/State Zip Code

Primary Phone Secondary Phone E-mail Address

**Correspondence concerning this property should be sent to: ☐ Owner ☐ Agent

I, the Owner / Agent for the above property, do hereby affirm that information submitted to acquire a rental license for the above property is correct. I agree to post the required occupancy limit sign, per B.R.C. 1981, Section 10-3-20.

Signature: _____Date: _____

Baseline Inspection Compliance Verification Form

Please return this portion of the Baseline Inspection Checklist

Note: By signing this form, the licensed inspector certifies that he/she performed the housing inspection for the rental property indicated below and found it complied with the requirements included in the checklist at the time of inspection. The inspector also certifies that he/she has no financial interest in the property and is not related in any way to the owner/agent or tenant.

Property Address_____Unit #_____

Owner/Agent Name_____

PART A – General Requirements

Company Name_____Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____

Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

PART B – Plumbing Facilities and Fixture Requirements

Company Name_____Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____

Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

BASELINE INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

PART C Sec. I-III – Mechanical Requirements

Company Name_____Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____
Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

PART C Sec. IV – Electrical Requirements

Company Name_____Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____
Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

PART D – Fire Safety Requirements

Company Name_____Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____
Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

BASELINE INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

The owner/agent must perform the following tests and certify compliance by signing below in order to complete the Baseline Inspection (B.R.C. 1981, 10-2, Section 608, “Carbon Monoxide Alarms” and Section 704, “Fire Protection Systems”).

1. Smoke and Carbon Monoxide Alarm Verification: Every smoke and carbon monoxide alarm functions properly, with the alarm sounding after pushing the test button. Smoke detectors must be installed inside sleeping rooms, outside sleeping areas in the immediate vicinity of bedrooms, and on each story. Carbon monoxide alarms must be within 15 feet of all bedrooms.

Number and location(s) of smoke alarms_____

_____

_____

Number and location(s) of carbon monoxide alarms_____

_____

_____

_____

Owner/Agent Signature Print Name Date

2. Trash Removal Verification: The City of Boulder requires all rental property owners to have a current and valid contract with a commercial trash removal contractor for removal of accumulated trash from the rental property. By signing below the owner/agent is certifying compliance to this requirement (B.R.C. 1981, 10-2, Section 308, Rubbish and Garbage” and 6-3, “Trash, Recyclables and Compostables”).

Commercial Contractor: _____

_____

Owner/Agent Signature Print Name Date

3. Energy Efficiency (SmartRegs) Requirements Verification: The City of Boulder's SmartRegs Ordinance No. 7726 requires that residential rental units comply with adopted energy efficiency standards by December 31, 2018. Property owners must demonstrate that their units are SmartRegs compliant in order to receive a full four-year rental license for any license effective on or after January 1, 2015. If a unit is not SmartRegs compliant, the city will issue a reduced-term rental license, expiring on December 31, 2018. If compliance is met before this deadline, the license term will extend to the full four-year period expiring four years from the effective date of the license. Failure to gain compliance may result in increased fees, fines, penalties, or other enforcement action.

By signing below, the owner/agent is certifying acknowledgement of this requirement, its deadline, and that checking “No” below will result in a reduced-term rental license until compliance is met.

This property has received a passing SmartRegs inspection demonstrating compliance with the requirement (B.R.C. 1981, 10-2, Appendix C, “Energy Efficiency Requirements"):

Yes No

_____

Owner/Agent Signature Print Name Date

BASELINE INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

4. Multiple Dwelling Units Map/Drawing: Properties with more than 1 dwelling unit must include a map or drawing of the property (label units according to addressing standards). You may submit this drawing below or on an attached sheet. If the property does not have more than 1 dwelling unit, this page may be left blank.

City of Boulder
Affidavit of Legal Residency

Section 1: Identification Documents

I,_____[print name], currently lawfully possess, and am providing a copy of, the following identification document as evidence of my lawful presence in the United States (check one):

_____ Valid Colorado driver's license or a Colorado identification card issued by the Department of Revenue

_____ United States military card or a military dependent's identification card

_____ United States Coast Guard Merchant Mariner card

_____ Native American tribal document

_____ Other documents allowed by the Colorado Department of Revenue Rules for Lawful Presence, which include a valid driver's license from another state. (1 CCR 201-17)

(available at http://www.colorado.gov/cs/Satellite?c=Page&cid=1216289012125&pagename=Revenue-Main%2FXRMLayout)

**Provide a clear copy of document you are relying upon to show your lawful presence in the United States.

Section 2: Citizenship Affidavit

I, _____ [print name], swear or affirm under penalty of perjury under the laws of the State of Colorado that (check one):

_____ I am a United States citizen, or

_____ I am not a United States resident but I am a Permanent Resident of the United States, or

_____ I am not a United States citizen but I am lawfully present in the United States pursuant to Federal law.

I understand that this sworn statement is required by law because I have applied for a public benefit. I understand that state law requires me to provide proof that I am lawfully present in the United States prior to receipt of this public benefit. I further acknowledge that making a false, fictitious, or fraudulent state-ment or representation in this sworn affidavit is punishable under the criminal laws of Colorado as perjury in the second degree under Colorado Revised Statute 18-8¬-503 and it shall constitute a separate criminal offense each time a public benefit is fraudulently received.

_____ _____

Signature Date

Baseline Inspection

The Baseline Inspection consists of four parts:

A. General Requirements:
I. Exterior Structure
II. Interior Structure
III. Light
IV. Ventilation
V. Occupancy Limitations

Part A of the Baseline Inspection must be performed by: City of Boulder Licensed D-9 contractor, OR City of Boulder Licensed General A, B or C contractor, OR Colorado Licensed Design Professional, OR ICC Certified Combination Inspector

B. Plumbing Facilities and Fixture Requirements:
I. Toilet Rooms
II. Plumbing Systems and Fixtures
III. Water System

Part B of the Baseline Inspection must be performed by: City of Boulder Licensed D-9 contractor, OR City of Boulder Licensed General A, B or C contractor, OR City of Boulder Licensed Plumber, OR Colorado Licensed Design Professional, OR ICC Certified Combination Inspector

C. Mechanical and Electrical Requirements:
I. General Mechanical
II. Boilers
III. Water Heaters
IV. General Electrical

Part C Sections I-III of the Baseline Inspection must be performed by:
City of Boulder Class A, B, or C mechanical license, OR
Be a Colorado Licensed Design Professional (Architect or Engineer), OR
ICC Certified Electrical or Combination Inspector, OR
Qualified Xcel Service Personnel

Part C Section IV of the Baseline Inspection must be performed by:
City of Boulder Licensed Electrician, OR
Colorado Licensed Design Professional, OR
ICC Certified Electrical or Combination Inspector, OR
ASHI or NAHI Certified Inspector

D. Fire Safety Requirements:
I. General
II. Smoke Alarms
III. Carbon Monoxide Alarms

Part D of the Baseline Inspection must be performed by: City of Boulder Licensed D-9 contractor, OR City of Boulder Licensed General A, B or C contractor, OR Colorado Licensed Designed Professional, OR ICC Certified Combination Inspector

E. IPMC Appendix C Energy Efficiency Requirements (Prescriptive)

Part E of the Baseline Inspection must be performed by: City of Boulder Licensed General Class G contractor*

* In addition to the detailed license requirements, must also be certified through a COB sponsored training program to inspect prescriptive energy efficiency measures.

Compliance. Effective January 2, 2019, the energy efficiency of existing residential rental dwelling units must comply with Section C101.2.1 for performance-based energy efficiency requirements or Section C101.2.2 for prescriptive-based energy efficiency requirements.

The City of Boulder encourages applicants to achieve compliance as early as possible. For information, please visit the website: **bouldercolorado.gov/SmartRegs**.

TIPS !

Baseline Inspection

Effective Jan. 3, 2011, for a new license, ONLY a Baseline Inspection is required. All parts of the Baseline Inspection Checklist must be completed by rental inspectors licensed through the City of Boulder. Companies may be licensed to perform one or all parts of this inspection. Please visit bouldercolorado.gov/plan-develop/rental-housing-licensing for a list of licensed contractors who can perform all parts of the baseline inspection. Before hiring any company to perform the rental licensing inspections, please ask the company to ensure their licenses are current with the City as our website list is not verified on a daily basis. Walk through your property prior to the inspection to make certain it meets the minimum requirements of the code. A checklist of items the inspector will look at is included on page 7. If you have tenants, notify them in advance of the inspection. Meet the inspector at the property on the scheduled date and time with the inspection checklist provided on page 7 and all necessary keys. At the completion of the inspection have the inspector sign the inspection compliance verification form on page 13. If the property does not meet the inspection standards the inspector may not be able to sign the form until the property is compliant with the code.

Baseline Inspection Checklist

Includes All Single and Multi-Unit Rental Properties

Effective January 2011

Rental Property Address:_____**Unit #**_____

_____

The Baseline Inspection Checklist and the Baseline Inspection Compliance Verification Forms are required to be completed and signed by the appropriate City of Boulder licensed inspector(s) and the owner/operator and returned to:

Planning and Development Services
c/o Rental Licensing Program
1739 Broadway, Third Floor
P. O. Box 791
Boulder, Colorado 80306

During all inspections, a property owner, tenant or agent must be present. The inspector(s) will do a visual inspection for compliance with this checklist based on the Boulder Property Maintenance Code [Boulder Revised Code 1981, Chapter 10-2]. Each inspection is only a visual examination of those elements and areas that are safely and readily accessible at the time of the inspection.

The licensed inspector(s) is/are not responsible for compliance with the city's property maintenance code either at the time of inspection or anytime thereafter. Compliance with the city property maintenance code is the responsibility of the owner. The owner must also verify that the smoke and carbon monoxide alarms are functioning properly and that a contract is signed for trash removal from the site and certify these actions by signing the attached Compliance Verification Form (page 13).

Existing structures and premises that comply with all applicable codes in place at the time of construction will be deemed to comply with this code except where the code official determines that the deviations from this code pose a danger to health, safety or welfare of the public or occupants and issues an order for the owner to correct those specific conditions or alterations (B.R.C. 1981, 10-2 Section 102.2, "Maintenance").

Please note the following:

☐Common areas of condominium complexes that provide access to individual units and are subject to homeowner association control may require life-safety issues to be addressed for individual units to obtain a rental license.

☐All items listed on the following pages must be inspected. An inspector must inspect each item or indicate not applicable (N/A) where such requirement does not apply. All outstanding safety issues must be corrected and verified by the inspector.

A. General Requirements: Light, Ventilation, and Occupancy Limitations

Section I – V License
Qualifications: City of Boulder
licensed D-9, OR General A, B or C
Contractor, OR
Colorado Licensed Design Professional,
OR ICC Certified Combination Inspector.

I. Exterior Structure

☐**1. General.** The exterior of a structure shall be maintained so as not to pose a threat to public health, safety or welfare. (IPMC 304.1.1, 1-13)

☐**2. Floodplain safety signage.** Structures located in a 100-year floodplain shall be posted with a warning sign that states: "This property is located in an area that is subject to sudden and severe flooding. In case of flood emergency be prepared to seek high ground immediately." For information visit www.boulderfloodinfo.net.

The sign shall be a metal plaque with minimum ¼" letters in a contrasting color attached to the structure with non-removable fasteners posted on the exterior of the building at the entrance. (IPMC 310; 9-3-3 (a) (10), B.R.C. 1981)

Note: The rental license inspector is responsible for informing the owner or operator if their unit is located in a designated floodplain requiring the safety signage.

☐**3. Address numbers.** Numbers are plainly visible from the street. (IPMC 304.3)

☐**4. Structural members.** All visible structural members appear to be properly installed and functioning as intended. (IPMC 304.4)

☐ **5. Foundation walls.** All foundation walls shall be free from open cracks and breaks which compromise wall integrity and shall be maintained so as to prevent the entry of rodents and other pests. (IPMC 304.5)

☐**6. Roofs.** The roof shall be sound, tight and not have defects that admit rain in order to prevent dampness or deterioration in the walls or interior portion of the structure. (IPMC 304.7)

☐**7. Window, skylight and door frames.** Every window, skylight, door and frame shall be kept in sound condition, good repair and weather tight. All glazing shall be maintained free from loose and broken glass. (IPMC 304.13, 30413.1)

☐**8. Exterior handrails and guards.** Safely maintained. (IPMC 304.12)

☐**9. Stairs, decks, porches and balconies.** Safely maintained. (IPMC 304.10)

II. Interior Structure

☐**1. General.** The interior and equipment therein shall be maintained in good repair, and in sanitary condition. (IPMC 305.1)

☐**2. Maintenance.** Equipment, systems, devices and safeguards required by the code in effect when the structure or premises was constructed, altered or repaired shall be maintained in good working order. (IPMC 101.3)

☐**3. Structural members.** All visible interior structural members appear to be properly installed and functioning as intended. (IPMC 305.2)

☐**4. Interior handrails and guards.** Safely maintained. (IPMC 305.5)

☐**5. Interior stairs, decks, porches and balconies.** Safely maintained. (IPMC 305.4)

III. Light

☐**1. Habitable spaces.** Every habitable space shall have at least one window of approved size (as required by the code in effect when the structure was built) facing directly to the outdoors or to a court, or shall be provided with artificial light in accordance with IBC 1205.3. (IPMC 402.1)

☐**2. Common halls and stairways**. Every common hall and stairway in residential occupancies, other than one-and two-family dwellings, shall be illuminated at all times with at least 765 lumens (60 watt incandescent or 14 watt cfl) for each 200 square feet of floor area, provided spacing between lights does not exceed 30 feet. (IPMC 402.2).

IV. Ventilation

☐**1. Habitable spaces.** Every habitable space shall have at least one openable window or mechanical ventilation. (IPMC 403.1)

☐**2. Bathrooms and toilet rooms.** An openable window or mechanical ventilation must be provided. (IPMC 403.2)

V. Occupancy Limitations

☐**1. Water closet accessibility.** Every bedroom shall have access to at least one water closet and one lavatory without passing through another bedroom. Every bedroom in a

dwelling unit shall have access to at least one water closet and lavatory located in the same story as the bedroom or an adjacent story. (IPMC 404.4.3)

☐**2. Prohibited occupancy.** Kitchens and non-habitable spaces shall not be used for sleeping rooms. (IPMC 404.4.4)

☐**3. Food preparation.** All spaces to be occupied for food preparation purposes shall contain suitable space and equipment to store, prepare and serve foods in a sanitary manner. There shall be adequate facilities and services for the sanitary disposal of food wastes and refuse, including facilities for temporary storage. (IPMC 404.7)

☐**4. Dwelling units.** Every dwelling unit shall contain its own bathtub or shower, lavatory, water closet and kitchen sink which shall be maintained in a sanitary, safe working condition. The lavatory shall be placed in the same room as the water closet or located in close proximity to the door leading directly into the room in which such water closet is located. A kitchen sink shall not be used as a substitute for the required lavatory (502.1)

☐**5. Rooming houses.** At least one water closet, lavatory and bathtub or shower shall be supplied for each four rooming units (502.2)

☐**6. Occupancy Limit sign posted.** Every rental property shall have a sign posted conspicuously on the inside of the main entrance to each dwelling unit the maximum number of unrelated individuals permitted under section 9-8-5 B.R.C. 1981 ("Occupancy of Dwelling Units"). The sign should be protected and must measure at least 8.5 inches x 11 inches in size, with text measuring at least 3/8 inch tall and read "Maximum Permissible Unrelated Occupancy (##) by Ordinance No. 8072 and the Boulder Revised Code (B.R.C. 1981) 10-3-16. Per city code, this sign must remain visibly posted on the inside of the main entrance."

B. Plumbing Facilities and Fixture Requirements

Section I –III License Qualifications:

City of Boulder licensed D-9 or General A, B or C Contractor, OR
City of Boulder Licensed Plumber, OR
Colorado Licensed Design Professional,
OR ICC Certified Combination Inspector

I. Toilet Rooms

☐**1. Privacy.** Toilet rooms and bathrooms shall provide privacy and shall not constitute the only passageway to a hall or other space, or to the exterior. A door and interior locking device shall be provided for all common or shared bathrooms and toilet rooms in a multiple dwelling (503.1)

☐**2. Location.** Toilet rooms and bathrooms serving room-ing units or housekeeping units shall have access from a common hall or passageway (503.2).

II. Plumbing Systems and Fixtures

☐**1. General.** All plumbing fixtures shall be properly installed and maintained in working order, and shall be kept free from obstructions, leaks and defects and be capable of performing the function for which such plumbing fixtures are designed. All plumbing fixtures shall be maintained in a safe, sanitary and functional condition. (IPMC 504.1)

☐**2. Fixture clearance.** Plumbing fixtures shall have adequate clearances for usage and cleaning. (IPMC 504.2)

III. Water Systems

☐**1. General.** All kitchen sinks, lavatories, laundry facilities, bathtubs and showers shall be supplied with hot or tempered and cold running water in accordance with the International Plumbing Code. (IPMC 505.1)

C. Mechanical and Electrical Requirements

Sections I – III License Qualifications:

City of Boulder licensed Mechanical A, B or C contractor, OR
Colorado Licensed Design Professional, OR
ICC Certified Electrical or Combination Inspector, OR
Qualified Xcel service personnel

Section IV License Qualifications:

City of Boulder Electrician's license, OR
Colorado Licensed Design Professional,
OR
ICC Certified Electrical or Combination Inspector, OR
ASHI or NAHI Certified Inspector

I. General Mechanical Requirements

Note: Electric baseboard heating systems are exempt from heating system tune-up requirements. If applicable, submit this form and clearly state "All Electric Heating."

☐**1. Mechanical appliances.** All mechanical appliances, fireplaces, solid fuel-burning appliances, cooking appliances and water heaters shall be properly installed and maintained in a safe working condition, and shall be capable of performing the intended function. (IPMC 603.1)

☐**2. Fireplaces and kitchen appliances.** Checked for safe installation. (IFGC 503, 504, 602.2, 604, 605, 623; IMC Chapter 8, 902-905, 917)

☐**3. Clothes dryer exhaust systems.** Shall be independent of all other systems and shall be exhausted outside the structure in accordance with the manufacturer's instructions. (IPMC 403.5)

Exception 1. Approved condensing (ductless) clothes dryers.

Exception 2. For electric clothes dryers, an approved commercially manufactured lint containment system within the appliance space and accessible for maintenance.

☐**4. Heating Facilities.** Every dwelling unit must be equipped with heating facilities capable of safely and adequately heating all habitable rooms and bathrooms to 68 degrees (measured at a location two feet away from walls and three feet above the floor). (IMC 309)

☐ **5. Gas Piping Materials.** Verify use of approved materials for gas piping. Non-complying gas pipe must be replaced with approved materials. (IFGC 403 & 406.1)

Gas Leaks: Where any gas leak is detected the inspector may shut off the gas at the appropriate location. The owner or operator of the facility must be contacted immediately. (IFGC 108.7)

☐**6. Shutoff valves.** The appliance gas shutoff valve must be accessible, in the same room and not further than six feet from the appliance. (IFGC 409.5)

☐**7. Furnace Location.** Gas fired furnaces accessed through bedrooms and bathrooms and not otherwise approved for those locations shall be provided with a solid weather-stripped door equipped with a self-closing device. All combustion air shall be taken from outside the building, and ducted to the room containing the furnace. (IFGC 303.3 & 304.6)

☐**8. Venting.** Appliance vents, connectors and draft diverters must be in sound condition, be of approved material, securely in place and free of obstructions and combustible deposits. The appliance venting system shall meet the draft requirements for the appliance in accordance with the manufacturer's instructions. (IFGC 501.15.2, 503.3.1, 503.12 & 801.2) Secure and replace as necessary.

☐**9. Combustion Air.** Verify adequate combustion air is provided for fuel burning appliances in mechanical rooms and enclosures. (IFGC 304.5-304.9) Correct combustion air supply as necessary.

☐**10. Clearances.** All single wall vent connectors for appliances shall maintain a minimum of six inches of clearance from combustibles. All B-vents serving appliances shall maintain a minimum of one inch of clearance from combustibles. Sufficient clearance must be maintained for cleaning and replacement of appliances (IFGC 306, 503.10.1-503.10.16) Correct clearance deficiencies.

☐**11. Piping identification.** Gas piping from multiple gas meter installations shall be marked with permanent identification so that the piping system supplied by each meter is readily identifiable. Each meter shall have a separate shutoff valve. (IFGC 401.7)

☐**12. Service requirement.** Conduct or verify service of all fuel burning appliances at time of inspection to include:

Clean combustible materials, dust and dirt in and around appliance, blower, motor, burners and controls.

Lubricate and adjustment of moving parts as needed.

Clean or replace of all filters (cleaning/replacement must occur as required by the appliance manufacturer).

Check all limit switches and replace if necessary.

Perform carbon monoxide testing of fuel-burning appliances with commercial testing instrument in accordance with testing instrument manufacturer's operating instructions and correct safety issues revealed by testing.

Check to assure heat exchangers are sound.

II. Boilers: **Boilers serving six or more dwelling units must maintain a valid certificate of inspection from the State of Colorado.**

Exception: Hot water supply storage tanks, including those designed for space heating, domestic or sanitary purposes that are not recirculating and not exceeding a heat input of 200,000 Btu/hour, a water temperature of 210 F and a capacity of 120 gallons or less.

Note: the cert. may be an annual or biennial certificate depending on the type of boiler (CRS 9-4-101-18 & ANSI/NB-23)

III. Water Heaters

☐**1. Access through bathrooms and bedrooms.** Water heaters accessed through bathrooms and bedrooms and not otherwise approved for those locations shall be provided with a solid weather-stripped door equipped with a self- closing device. All combustion air shall be taken from outside the building, and ducted to the room. (IFGC 303.3)

☐**2. Required features.** Water heaters must have a temperature and pressure relief valve, discharge piping a maximum of six inches above floor or waste receptor, an accessible shut-off valve and safety pilot assembly. (IPC 504)

IV. General Electrical Equipment

☐ **1. Installation.** All electrical equipment, wiring and appliances shall be properly installed and maintained in a safe and approved manner. (IPMC 605.1)

☐**2. Electrical faceplates.** Sound and maintained in place. (IPMC 604.3)

☐**3. Extension cords.** Not to be used for permanent wiring where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings, floors, through doorways, windows, or similar openings. (IPMC 605.5)

☐**4. Electrical circuits.** Each occupant shall have ready access to all circuit breakers protecting the conductors supplying that occupancy. [NEC sec.240.24 (B)] Exception: Rental housing units constructed or converted to rental housing units and licensed prior to Dec. 7, 1971.

☐**5. Electrical panelboards.** Panelboard covers shall be removed and panelboards inspected to verify safety of all wiring, grounding, breakers and fuses as detailed in the National Electrical Code. (NEC chapters 1-4)

☐**6. Receptacles.** Every habitable space in a dwelling shall contain at least two separate and remote receptacle outlets. Every laundry area shall contain at least one grounded-type receptacle or a receptacle with a ground fault circuit interrupter. Any new bathroom receptacle outlet shall have ground fault circuit interrupter protection. (IPMC 605.2)

☐**7. Non-grounding-type electrical receptacles** (two-prong receptacles). Where attachment to an equipment grounding conductor (two-wire circuits) does not exist in the receptacle enclosure, the installation shall comply with a, b or c below.

Two-prong receptacle shall be permitted to be replaced with another two-prong receptacle.

A two-prong receptacle shall be permitted to be replaced with a ground-fault circuit interrupter type (GFCI) three-prong receptacle. These receptacles shall be marked "No Equipment Ground." An equipment grounding conductor shall not be connected from the GFCI-type receptacle to any outlet supplied from the GFCI-type receptacle.

A two-prong receptacle shall be permitted to be replaced with a three-prong, grounding-type receptacle where supplied through a GFCI device.

Three-prong, grounding-type receptacles, supplied through the GFCI shall be marked "GFCI Protected" and "No Equipment Ground." An equipment grounding conductor shall not be connected between the grounding-type receptacles.

☐**8. Luminaires**. Every public hall, interior stairway, toilet room, kitchen, bathroom, laundry room, boiler room and furnace room shall contain at least one electric luminarie (light fixtures). (IPMC 605.3)

D. Fire Safety Requirements

Section I – III License Qualifications:

City of Boulder licensed D-9 or General A, B or C contractor, OR
Colorado Licensed Design Professional, OR ICC Certified Combination Inspector

I. General

☐**1. General.** A safe continuous and unobstructed path of travel shall be provided from any point in a building or structure to the public way. Means of egress shall comply with the International Fire Code. (IPMC 702.1)

☐**2. Locked doors.** All means of egress doors shall be readily openable from the side from which egress is to be made without the need for keys, special knowledge or effort, except where the door hardware conforms to that permitted by the International Building Code. (IPMC 702.3)

☐**3. Emergency escape openings.** Required emergency escape openings shall be maintained in accordance with the code in effect at the time of construction, and the following. Required emergency escape and rescue openings shall be operational from inside of the room without the use of keys or tools. Bars, grilles, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the code that was in effect at the time of construction and such devices shall be removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. (IPMC 702.4)

☐**4. Fire Resistance-rated assemblies.** The required fire-resistance rating of fire-resistance rated walls, fire stops, shaft enclosures, partitions and floors shall be maintained. (IPMC 703.1)

☐**5. Barbeque safety.** Charcoal burners and other open-flame cooking devices shall not be operated on combustible balconies or within 10 feet of combustible construction. (IFC 308)

Exception 1: One-and two-family dwellings.

Exception 2: Where buildings, balconies and decks are protected by an automatic sprinkler system.

Exception 3: LP-gas cooking devices having an LP-gas container with a water capacity not greater than 2½ pounds (nominal 1lb. LP-gas capacity).

☐**6. Portable fire extinguishers.** Portable fire extinguishers shall be installed in structures containing three or more rental units with interior corridors and/or common areas as detailed below. (IFC 906)

Install fire extinguisher where access is not obstructed or obscured from view.

Install fire extinguisher with mounting bracket provided by manufacturer.

Fire extinguisher installed in a cabinet shall not be locked unless subject to malicious use or damage.

Provide means for ready access for fire extinguisher locked in a cabinet.

The minimum rating for a fire extinguisher is 2-A.
A fire extinguisher is required on each floor level.

The maximum travel distance to a fire extinguisher is 75 feet.

The maximum height of a fire extinguisher is 5 feet above the floor.

II. Smoke Alarms

☐**1. Smoke alarm inspections.** Smoke alarm inspections are required to be conducted by the property owner as detailed below.

Smoke alarms. Smoke alarms which receive their primary power from the building wiring shall be checked for good operating condition once each year and if supplied with battery backup, the battery shall be replaced as necessary for proper function of the smoke alarm.

Battery-powered smoke alarms. Battery-powered smoke alarms shall be tested for proper function on an annual basis. Batteries shall be replaced as necessary for proper function of the smoke alarm.

Single- or multiple-station smoke alarms: shall be installed and maintained in Groups R-2, R-3, R-4 and in dwellings regulated in Group R occupancies, regardless of occupant load at all of the following locations. (IPMC 704.2):
On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.

In each room used for sleeping purposes.

In each story within a dwelling unit, including basements and cellars, but not crawl spaces and uninhabitable attics.

In dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Listed and labeled combination smoke and carbon monoxide alarms are approved for use when installed in accordance with manufacture's installation instructions.

III. Carbon Monoxide Alarms

☐**1. Carbon monoxide alarms.** Carbon monoxide alarm inspections are required to be conducted by the property owner or agent as detailed below. Carbon monoxide alarms are to be installed in existing residential structures in accordance with Colorado state law effective on July 1, 2009.(IPMC 608.1)

Carbon monoxide alarms are required to be installed in existing dwellings and rented single and multi-family dwellings that have fuel fired heaters, appliances or fireplaces or attached garages based on the following guidelines:

Carbon monoxide alarms which receive their primary power from the building wiring shall be checked for good operating condition once each year and supplied with battery back-up, the battery shall be replaced as necessary for proper function of the carbon monoxide alarm.

Battery-powered carbon monoxide alarms shall be tested for proper function on an annual basis. Batteries shall be replaced as necessary for proper function of the carbon monoxide alarm.

Listed and labeled combination smoke and carbon monoxide alarms are approved for use when installed in accordance with manufacture's installation instructions.

E. IPMC Appendix C Energy Efficiency Requirements (Future)

License Qualifications:
City of Boulder licensed General Class G contractor*

* In addition to the base detailed license requirements, must also be certified through a City of Boulder sponsored training program to inspect prescriptive energy efficiency measures.

Compliance. Effective January 2, 2019, the energy efficiency of existing residential rental dwelling units must comply with Section C101.2.1 for performance-based energy efficiency requirements or Section C101.2.2 for prescriptive-based energy efficiency requirements.

The City of Boulder encourages applicants to achieve compliance as early as possible. **bouldercolorado.gov/SmartRegs**

Additional Code Related Safety Items Noted Here:

The inspector will not certify a completed baseline inspection until all outstanding issues have been addressed and confirmed at re-inspection. Scheduling a re-inspection is the responsibility of the owner/agent and is performed by a licensed rental-housing inspector.

APPLY FOR A RENEWAL LICENSE

1. **Obtain rental license application** information by reviewing the materials in this handbook or by printing all relevant forms at bouldercolorado.gov/plan-develop/applications. You may also call 303-441-3152 or visit the Planning and Development Services Center located at 1739 Broadway, Third Floor.

2. **Schedule an appointment for a renewal inspection** with a private inspection contractor.

3. **Complete the application packet.** Note: Property owners not residing in Boulder County must appoint a local agent within 60 minutes of the property. Complete one application per single dwelling unit OR one application per each multi-unit building.

Quick Notes

RENEWING a Rental License

A renewal rental license is required when the current rental license is set to expire.

- ☐ **Completed Rental Housing License Application** (Found on page 18)
- ☐ **License Fee Payable to City of Boulder** License fee is $105 per single dwelling unit OR $105 per building for multi-unit buildings.
- ☐ **Completed Renewal Inspection Compliance Verification Forms:** Including the Smoke and Carbon Monoxide Alarm Verification, Trash Removal Verification, SmartRegs Verification and the multi-dwelling unit drawing for buildings with more than 1 dwelling unit. The first two pages must be completed and signed by a licensed rental housing inspector and the remaining pages should be completed and signed by the owner or agent. (Found on pages 19-21a)
- ☐ **Affidavit of Legal Residency:** State law requires the City of Boulder to verify that applicants obtaining certain public benefits are lawfully present in the United States. The verification process has three stages:
  - A. The owner shows a form of identification as detailed on the affidavit form. (Found on page 22)
  - B. The owner completes an affidavit.
  - C. For non-citizens, the city verifies the owner is lawfully present through the SAVE program. See Affidavit of Legal Residency form.

4. **Make copies of all forms for your records.**

5. **Submit all forms together as a complete packet.** Incomplete packets will be returned to the applicant. Mail or drop off all required items (application, fee, signed inspection compliance verification form, and Affidavit of Legal Residency:

Planning and Development Services c/o Rental Licensing Program
1739 Broadway, Third Floor
P. O. Box 791
Boulder, Colorado 80306

6. **A copy of the rental license certificate** will be mailed to you and is valid for four years or until the property is sold. Properties that have not met SmartRegs compliance at the time of renewal will expire on December 31, 2018.

Rental Housing License Application

(Please submit a $105.00 fee with application. Make checks payable to "City of Boulder")

Rental Property Address Unit/Apt. # Zip Code

Number of Dwelling Units _____

Number of Rooming Units _____ Number of Bedrooms_____

Building Type (Check One):
Properties with more than 1 dwelling unit must include a map/drawing of the property indicating which unit(s) are rentals.

☐ Single Family Dwelling ☐ Condominium ☐ Apartment Building ☐ Manufactured/Mobile Home

☐ Duplex ☐ Tri-Plex ☐ Four-Plex ☐ Fraternity ☐ Sorority ☐ Bed & Breakfast ☐ Townhome

☐ Single Family Dwelling with Accessory Unit (must also be permitted through P&DS; call 303.441.1880 for more info)

Complex Name (if applicable)_____

PROPERTY OWNER: *required fields

First Name* Middle Initial Last Name*

Address* City/State* Zip Code

Primary Phone* Secondary Phone E-mail Address*

LOCAL AGENT: A property owner who does not reside in Boulder County shall appoint a person who lives in Boulder County to serve as the local agent of the owner. B.R.C. 1981, Section 10-3-14.

First Name Middle Initial Last Name

Address City/State Zip Code

Primary Phone Secondary Phone E-mail Address

**Correspondence concerning this property should be sent to: ☐ Owner ☐ Agent

I, the Owner / Agent for the above property, do hereby affirm that information submitted to acquire a rental license for the above property is correct. I agree to post the required occupancy limit sign, per B.R.C. 1981, Section 10-3-20.

Signature: _____Date: _____

Renewal Inspection Compliance Verification Form

Please return this portion of the Renewal Inspection Checklist

Note: By signing this form, the licensed inspector certifies that he/she performed the housing inspection for the rental property indicated below and found it complied with the requirements included in the checklist at the time of inspection. The inspector also certifies that he/she has no financial interest in the property and is not related in any way to the owner/agent or tenant.

Property Address_____ Unit #_____

Owner/Agent Name_____

PART A – General Life Safety Requirements

Company Name_____ Contractor license #_____

Type of license _____Telephone #_____

Name of Inspector_____

Signature Please print name

Date of inspection compliance_____ (Must be completed within the previous 12 months)

PART B – IPMC Appendix C Energy Efficiency Requirements (Prescriptive)

Compliance. Effective January 2, 2019, the energy efficiency of existing residential rental dwelling units must comply with Section C101.2.1 for performance-based energy efficiency requirements or Section C101.2.2 for prescriptive-based energy efficiency requirements.

The City of Boulder encourages applicants to achieve compliance as early as possible. For information, please visit the website: **www.bouldercolorado.gov/smartregs**.

RENEWAL INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

PART C – Mechanical Requirements

Company Name_____ Contractor license #_____

Type of license _____ Telephone #_____

Name of Inspector_____
Signature Please print name

Date of inspection compliance_____(Must be completed within the previous 12 months)

PART D – Electrical Requirements

Company Name_____ Contractor license #_____

Type of license _____ Telephone #_____

Name of Inspector_____
Signature Please print name

Date of inspection compliance_____(Must be completed within the previous 12 months)

RENEWAL INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

The owner/agent must perform the following tests and certify compliance by signing below in order to complete the Baseline Inspection (B.R.C. 1981, 10-2, Section 608, “Carbon Monoxide Alarms” and Section 704, “Fire Protection Systems”).

1. Smoke and Carbon Monoxide Alarm Verification: Every smoke and carbon monoxide alarm functions properly, with the alarm sounding after pushing the test button. Smoke detectors must be installed inside sleeping rooms, outside sleeping areas in the immediate vicinity of bedrooms and on each story. Carbon monoxide alarms must be within 15 feet of all bedrooms.

Number and location(s) of smoke alarms_____

_____

_____

Number and location(s) of carbon monoxide alarms_____

_____

_____

_____

Owner/Agent Signature Print Name Date

2. Trash Removal Verification: The City of Boulder requires all rental property owners to have a current and valid contract with a commercial trash removal contractor for removal of accumulated trash from the rental property. By signing below the owner/agent is certifying compliance to this requirement (B.R.C. 1981, 10-2, Section 308, Rubbish and Garbage” and 6-3, “Trash, Recyclables and Compostables”).

Commercial contractor:_____

_____

Owner/Agent Signature Print Name Date

3. Energy Efficiency (SmartRegs) Requirements Verification: The City of Boulder's SmartRegs Ordinance No. 7726 requires that residential rental units comply with adopted energy efficiency standards by December 31, 2018. Property owners must demonstrate that their units are SmartRegs compliant in order to receive a full four-year rental license for any license effective on or after January 1, 2015. If a unit is not SmartRegs compliant, the city will issue a reduced-term rental license, expiring on December 31, 2018. If compliance is met before this deadline, the license term will extend to the full four-year period expiring four years from the effective date of the license. Failure to gain compliance may result in increased fees, fines, penalties, or other enforcement action.

By signing below, the owner/agent is certifying acknowledgement of this requirement, its deadline and that checking “no” below will result in a reduced-term rental license until compliance is met.

This property has received a passing SmartRegs inspection demonstrating compliance with the requirement (B.R.C. 1981, 10-2, Appendix C, “Energy Efficiency Requirements"):

Yes No

_____

Owner/Agent Signature Print Name Date

RENEWAL INSPECTION COMPLIANCE VERIFICATION FORM CONTINUED

4. Multiple Dwelling Units Map/Drawing: Properties with more than 1 dwelling unit must include a map or drawing of the property (label units according to addressing standards). You may submit this drawing below or on an attached sheet. If the property does not have more than 1 dwelling unit, this page may be left blank.

City of Boulder
Affidavit of Legal Residency

Section 1: Identification Documents

I,_____[print name], currently lawfully possess, and am providing a copy of, the following identification document as evidence of my lawful presence in the United States (check one):

_____ Valid Colorado driver's license or a Colorado identification card issued by the Department of Revenue

_____ United States military card or a military dependent's identification card

_____ United States Coast Guard Merchant Mariner card

_____ Native American tribal document

_____ Other documents allowed by the Colorado Department of Revenue Rules for Lawful Presence, which include a valid driver's license from another state. (1 CCR 201-17)

(available at http://www.colorado.gov/cs/Satellite?c=Page&cid=1216289012125&pagename=Revenue-Main%2FXRMLayout)

**Provide a clear copy of document you are relying upon to show your lawful presence in the United States.

Section 2: Citizenship Affidavit

I, _____ [print name], swear or affirm under penalty of perjury under the laws of the State of Colorado that (check one):

_____ I am a United States citizen, or

_____ I am not a United States resident but I am a Permanent Resident of the United States, or

_____ I am not a United States citizen but I am lawfully present in the United States pursuant to Federal law.

I understand that this sworn statement is required by law because I have applied for a public benefit. I understand that state law requires me to provide proof that I am lawfully present in the United States prior to receipt of this public benefit. I further acknowledge that making a false, fictitious, or fraudulent state-ment or representation in this sworn affidavit is punishable under the criminal laws of Colorado as perjury in the second degree under Colorado Revised Statute 18-8-503 and it shall constitute a separate criminal offense each time a public benefit is fraudulently received.

_____ _____

Signature Date

Renewal Inspection

The Renewal Inspection consists of four parts:

A. General Life Safety Requirements:

Part A of the Renewal Inspection must be performed by: City of Boulder Licensed D-9 contractor, OR City of Boulder Licensed General A, B or C contractor

Note: The smoke and carbon monoxide alarm verification and trash removal verification sections of the Renewal Inspection can be completed by the property owner or their agent.

B. IPMC Appendix C Energy Efficiency Requirements (Prescriptive)

Part B of the Renewal Inspection must be performed by: City of Boulder licensed General Class G contractor*

* In addition to the detailed license requirements, must also be certified through a COB sponsored training program to inspect prescriptive energy efficiency measures.

Compliance. Effective January 2, 2019, the energy efficiency of existing residential rental dwelling units must comply with Section C101.2.1 for performance-based energy efficiency requirements or Section C101.2.2 for prescriptive-based energy efficiency requirements.

The City of Boulder encourages applicants to achieve compliance as early as possible. For information, please visit the website: **www.bouldercolorado.gov/smartregs.**

C. Mechanical Requirements:

I. General Mechanical
II. Boilers
III. Water Heaters

Part C of the Renewal Inspection must be performed by:
City of Boulder Class A, B or C mechanical license, OR
Colorado Licensed Design Professional, OR
ICC Certified Combination Inspector, OR
Qualified Xcel service personnel

D. Electrical Requirements:

Part D of the Renewal Inspection must be performed by:
City of Boulder Licensed Electrician, OR
Colorado Licensed Design professional, OR,
ICC Certified Electrical or Combination Inspector, OR
ASHI or NAHI Certified Inspector

Quick Notes

Required Inspections for Renewal License
Effective Jan. 3, 2011, for a renewal license, ONLY a Renewal Inspection is required. All parts of the Renewal Inspection Checklist must be completed by rental inspectors licensed through the City of Boulder. Companies may be licensed to perform one or all parts of this inspection.

TIPS !

Renewal Inspection

Please visit www.boulderplandevelop.net/ for a list of rental for a list of licensed contractors who can perform all parts of the renewal inspection. Before hiring any company to perform the rental licensing inspections, please ask the company to ensure their licenses are current with the City as our website list is not verified on a daily basis.

Walk through your property prior to the inspection and make certain it meets the minimum requirements of the code. A check- list of items the inspector will look at is included on page xx.

If you have tenants, notify them in advance of the inspection. Meet the inspector at the property on the scheduled date and time with the inspection checklist provided on page xx and all necessary keys.

At the completion of the inspection have the inspector sign the inspection compliance verification form on page xx. If the property does not meet the inspection standards the inspector may not be able to sign the form until the property is compliant with the code.

Renewal Inspection Checklist

Includes All Single and Multi-Unit Rental Properties

Effective January 2011

Rental Property Address:_____**Unit#**_____

_____

This Renewal Inspection Checklist and Renewal Inspection Compliance Verification Forms are required to be completed and signed by the appropriate City of Boulder licensed inspector(s) and the owner/operator and returned to:

Planning and Development Services
c/o Rental Licensing Program
1739 Broadway, Third Floor
P. O. Box 791
Boulder, Colorado 80306

During all inspections, a property owner, tenant or agent must be present. The inspector(s) will do a visual inspection for compliance with this checklist based on the Boulder Property Maintenance Code [Boulder Revised Code 1981, Chapter 10-2]. Each inspection is only a visual examination of those elements and areas that are safely and readily accessible at the time of the inspection.

The licensed inspector(s) is/are not responsible for compliance with the city's property maintenance code either at the time of inspection or anytime thereafter. Compliance with the city property maintenance code is the responsibility of the owner. The owner must also verify that the smoke and carbon monoxide alarms are functioning properly and that a contract is signed for trash removal from the site and certify these actions by signing the attached Compliance Verification Form.

Existing structures and premises that comply with all applicable codes in place at the time of construction will be deemed to comply with this code except where the code official determines that the deviations from this code pose a danger to health, safety or welfare of the public or occupants and issues an order for the owner to correct those specific conditions or alterations (B.R.C. 1981, 10-2 Section 102.2, "Maintenance").

Please note the following:

☐Common areas of condominium complexes that provide access to individual units and are subject to homeowner association control may require life-safety issues to be addressed for individual units to obtain a rental license.

☐All items listed on the following pages must be inspected. An inspector must inspect each item or indicate not applicable (N/A) where such requirement does not apply. All outstanding safety issues must be corrected and verified by the inspector.

A. General Life Safety Requirements

License Qualifications:
City of Boulder licensed D-9, OR
General A, B or C contractor

☐**1. Maintenance.** Equipment, systems, devices and safeguards required by the code in effect when the structure or premises was constructed, altered or repaired shall be maintained in good working order. (IPMC 101.3)

☐**2. Floodplain safety signage.** Structures located in a 100-yearfloodplain shall be posted with a warning sign that states: "This property is located in an area that is subject to sudden and severe flooding. In case of flood emergency be prepared to seek high ground immediately." For information see www.boulderfloodinfo.net.

The sign shall be a metal plaque with minimum ¼" letters in a contrasting color attached to the structure with non-removable fasteners posted on the exterior of the building at the entrance. (IPMC 310; 9-3-3 (a) (10), B.R.C. 1981)

Note: The rental license inspector is responsible for inform- ing the owner or operator if their unit is located in a designated floodplain and requires the safety signage.

☐**3. Address numbers**. Numbers are plainly visible from the street. (IPMC 304.3)

☐**4. Window, skylight and door frames.** Every window, skylight, door and frame shall be kept in sound condition, good repair and weather tight. All glazing shall be maintained free from loose and broken glass. (IPMC 304.13, 304.13.1)

☐**5. Fireplaces and kitchen appliances.** Appliances are checked for safe installation. (IFGC 503, 504, 602.2, 604, 605, 623; IMC Chapter 8, 902-905, 917)

☐**6. Common area.** Corridor walls, door ratings and clear egress path is maintained to exterior exits. (IPMC 702)

☐**7. Interior and exterior handrails and guards.** Safely maintained. (IPMC 304.12, 305.5)

☐**8**. **Interior and exterior stairs, decks, porches and balconies.** Safely maintained. (IPMC 304.10, 305.4)

☐**9. BBQ safety.** Charcoal burners and other open-flame cooking devices shall not be used on combustible balconies or within 10 feet of combustible construction. (IFC 308)

Exception 1. One-and two-family dwellings.

Exception 2. Where buildings, balconies and decks are protected by an automatic sprinkler system.

Exception 3. LP-gas cooking devices having an LP-gas container with a water capacity not greater than 2½ pounds (nominal 1 pound LP-gas capacity).

☐**10. Portable fire extinguishers.** Portable fire extinguishers shall be installed in structures containing three or more rental units with interior corridors and/or common areas as detailed below. (IFC 906)

Install fire extinguisher where access is not obstructed or obscured from view.

Install fire extinguisher with mounting bracket provided by manufacturer.

Fire extinguisher installed in a cabinet shall not be locked unless subject to malicious use or damage.

Provide means for ready access for fire extinguisher locked in a cabinet.

The minimum rating for a fire extinguisher is 2-A.

A fire extinguisher is required on each floor level.

The maximum travel distance to a fire extinguisher is 75 feet.

The maximum height of a fire extinguisher is 5 feet above the floor.

☐**11. Smoke alarm inspections.** Smoke alarm inspections are required to be conducted by the property owner as detailed below.

Smoke alarms. Smoke alarms which receive their primary power from the building wiring shall be checked for good operating condition once each year and if supplied with battery backup, the battery shall be replaced as necessary for proper function of the smoke alarm.

Battery-powered smoke alarms. Battery-powered smoke alarms shall be tested for proper function on an annual basis. Batteries shall be replaced as necessary for proper function of the smoke alarm.

Single- or multiple-station smoke alarms. Shall be installed and maintained in Groups R-2, R-3, R-4 and in dwellings regulated in Group R occupancies, regardless of occupant load at all of the following locations. (IPMC 704.2):

On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.

In each room used for sleeping purposes.

In each story within a dwelling unit, including basements and cellars, but not crawl spaces and uninhabitable attics. In dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Listed and labeled combination smoke and carbon monoxide alarms are approved for use when installed in accordance with manufacture's installation instructions.

☐ **12. Carbon monoxide alarms.** Carbon monoxide alarm inspections are required to be conducted by the property owner or agent as detailed below. Carbon monoxide alarms are to be installed in existing residential structures in accordance with Colorado state law effective on July 1, 2009. (IPMC 608.1)

Carbon monoxide alarms are required to be installed in existing dwellings and rented single and multi-family dwellings that have fuel fired heaters, appliances or fireplaces or attached garages based on the following guidelines:

Carbon monoxide alarms which receive their primary power from the building wiring shall be checked for good operating condition once each year and supplied with battery back-up; the battery shall be replaced as necessary for proper function of the carbon monoxide alarm.

Battery-powered carbon monoxide alarms shall be tested for proper function on an annual basis. Batteries shall be replaced as necessary for proper function of the carbon monoxide alarm.

Listed and labeled combination smoke and carbon monoxide alarms are approved for use when installed in accordance with manufacture's installation instructions.

B. IPMC Appendix C Energy Efficiency Requirements (Future)

License Qualifications:

City of Boulder licensed General Class G contractor*

* In addition to the base detailed license requirements, must also be certified through a City of Boulder sponsored training program to inspect prescriptive energy efficiency measures.

Compliance. Effective January 2, 2019, the energy efficiency of existing residential rental dwelling units must comply with Section C101.2.1 for performance-based energy efficiency requirements or Section C101.2.2 for prescriptive-based energy efficiency requirements.

The City of Boulder encourages applicants to achieve compliance as early as possible. For information, please visit the website: **www.bouldercolorado.gov/smartregs.**

C. Mechanical Requirements

License Qualifications:

City of Boulder licensed Mechanical A, B or C contractor, OR
Colorado Licensed Design Professional,
OR ICC Certified Combination Inspector,
OR Qualified Xcel Personnel

Note: Electric baseboard heating systems are exempt from heating system tune-up requirements. If applicable, submit this form, clearly stating "All Electric Heating".

I. General Mechanical Requirements

☐**1. Clothes dryer exhaust systems:** Shall be independent of all other systems and shall be exhausted outside the structure in accordance with the manufacturer's instructions. (IPMC 403.5)

Exception 1. Approved condensing (ductless) dryers.

Exception 2. For electric clothes dryers, an approved commercially manufactured lint containment system within the appliance space and accessible for maintenance.

☐**2. Heating Facilities.** Every dwelling unit must be equipped with heating facilities capable of safely and adequately heating all habitable rooms and bathrooms to 68 degrees (measured at a location two feet away from walls and three feet above the floor). (IMC 309)

☐ **3. Gas Piping Materials.** Verify use of approved materials for gas piping. Non-complying gas pipe must be replaced with approved materials. (IFGC 403 & 406.1) Correct as necessary.

Gas Leaks: Where any gas leak is detected the inspector may shut off the gas at the appropriate location. The owner or operator of the facility must be contacted immediately. (IFGC 108.7)

☐**4. Shutoff valves.** The appliance gas shutoff valve must be accessible, in the same room and not further than six feet from the appliance. (IFGC 409.5)

☐**5. Furnace Location.** Gas fired furnaces accessed through bedrooms and bathrooms and not otherwise approved for those locations shall be provided with a solid weather-stripped door equipped with a self-closing device. All combustion air shall be taken from outside the building, and ducted to the room containing the furnace. (IFGC 303.3 & 304.6)

☐**6. Venting.** Appliance vents. Connectors and draft diverters must be in sound condition, be of approved material, securely in place and free of obstructions and combustible deposits. The appliance venting system shall meet the draft requirements for the appliance in accordance with the manufacturer's instructions. (IFGC 501.15.2, 503.3.1, 503.12 & 801.2) Secure and replace as necessary.

☐**7. Combustion Air.** Verify adequate combustion air is provided for fuel burning appliances in mechanical rooms and enclosures. (IFGC 304.5-304.9) Correct combustion air supply as necessary.

☐**8. Clearances.** All single wall vent connectors for appliances shall maintain a minimum of six inches of clearance from combustibles. All B-vents serving appliances shall maintain a minimum of one inch of clearance from combustibles. Sufficient clearance must be maintained for cleaning and replacement of appliances (IFGC 306, 503.10.1-503.10.16) correct clearance deficiencies.

☐**9. Piping identification.** Gas piping from multiple gas meter installations shall be marked with permanent identification so that the piping system supplied by each meter is readily identifiable. Each meter shall have a separate shutoff valve. (IFGC 401.7)

☐**10. Service requirement.** Conduct or verify service of all fuel burning appliances at time of inspection. Clean combustible materials, dust and dirt in and around appliance, blower, motor, burners and controls. Lubricate and adjustment of moving parts as needed.

Clean or replace of all filters (cleaning/replacement must occur as required by the appliance manufacturer).

Check all limit switches and replace if necessary. Perform carbon monoxide testing of fuel-burning appliances with commercial testing instrument in accordance with testing instrument manufacturer's operating instructions and correct safety issues revealed by testing.

Check to assure heat exchangers are sound.

II. Boilers: **Boilers serving six or more dwelling** units must maintain a valid certificate of inspection from the State of Colorado.

Exception: Hot water supply storage tanks, including those designed for space heating, domestic or sanitary purposes that are not recirculating and not exceeding a heat input of 200,000 Btu/hour, a water temperature of 210 F and a capacity of 120 gallons or less.

Note: Certification may be an annual or biennial certificate depending on the type of boiler (CRS 9-4-101-18 and ANSI/NB-23)

III. Water Heaters

☐**1. Access through bathrooms and bedrooms.** Water heaters accessed through bathrooms and bedrooms and not otherwise approved for those locations shall be provided with a solid weather-stripped door equipped with a self-closing device. All combustion air shall be taken from outside the building, and ducted to the room. (IFGC 303.3)

☐ **2. Required features.** Water heaters must have a temperature and pressure relief valve, discharge piping a maximum of six inches above floor or waste receptor, an accessible shut-off valve and safety pilot assembly. (IPC 504)

D. Electrical Requirements

License Qualifications:
City of Boulder Electrician's license, OR
Colorado Licensed Design Professional,
OR
ICC Certified Electrical or Combination Inspector, OR
ASHI or NAHI Certified Inspector

☐**1. Electrical faceplates.** Sound and maintained in place. (IPMC 604.3)

☐**2. Extension cords.** Not to be used for permanent wiring where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings, floors, through doorways, windows, or similar openings. (IPMC 605.5)

☐**3. Electrical panelboards.** Panelboard covers shall be removed and panelboards inspected to verify safety of all wiring, grounding, breakers and fuses as detailed in the National Electrical Code. (NEC chapters 1-4)

Additional Code Related Safety Items Noted Here:

The inspector will not certify a completed renewal inspection until all outstanding issues have been addressed and all items completed at re-inspection. Scheduling a re-inspection is the responsibility of the owner/agent and is performed by a licensed rental-housing inspector.

Rental Housing Tenant Complaint Procedure

The City of Boulder has adopted and enforces building codes to maintain life and safety requirements. In Title 10-2, the "Boulder Property Maintenance Code," Boulder Revised Code 1981, Section 101.2, the "Scope" states that the code is adopted: "... for existing premises and structures for light, ventilation, space, heating, sanitation, protection from the elements, life safety, safety from fire and other hazards, and for safe and sanitary maintenance; the responsibility of owners, operators and occupants; the occupancy of existing structures and premises, and for enforcement and penalties." This section sets parameters for maintaining existing buildings within the city, including rental properties.

Rental housing tenants experiencing life and safety concerns or living in an unlicensed rental unit are first encouraged to work with their landlords to address these concerns. Tenants may also choose to work with the city's Mediation Program, which can be reached at 303-441-4364. Should this process fail, the tenant(s) can then contact the Planning and Development Services (P&DS) center to file a complaint. The general number to file a complaint through the P&DS center is 303-441-1880. The following information will need to be provided to the City in order to open a case and process the complaint:

1. Complainant's name and phone number (not divulged to the landlord or owner)

2. Address of property and unit number

3. Property landlord or owner's name and contact information, if known

4. A brief description of the life and safety or rental license concern

For life and safety complaints, a city building inspector normally contacts the tenant to schedule an inspection to understand the extent of the issue and set up the process to mitigate the complaint.

If the complaint is determined to be a valid life and safety or rental license issue, the building inspector or code enforcement officer will contact the landlord or owner and work toward voluntary compliance of the life and safety or rental license complaint. If the life and safety or rental license compliance is not obtained on a voluntary basis within a given time period, the city will issue a summons bringing the landlord or owner into the City of Boulder Municipal Court system to obtain compliance. A series of fees and penalties are detailed in the Boulder Revised Code 1981, Section 10-3-16 and 10-3017, for staff and the courts to follow for obtaining life and safety and rental license compliance.

Important information regarding a property's rental license status is available to tenants at the City of Boulder website (www.boulderplandevelop.net) or by calling the P&DS center at 303.441.1880. Rental licenses are to be renewed every four years with a renewal inspection performed by a city-licensed private inspector.

Property Maintenance Code Overview

The Property Maintenance Code (PMC) establishes minimum maintenance standards for basic equipment, light, ventilation, heating, sanitation and fire safety. Responsibility for code compliance is addressed for owners, operators and tenants.

The PMC consists of eight chapters and appendices A, B, and C. The complete PMC is located at: www.iccsafe.org/Store/Pages/FreeCodes.aspx" www.iccsafe.org/Store/Pages/FreeCodes.aspx The following is a chapter-by-chapter summary of the PMC provisions with the exception of Appendix C, Energy Efficiency.

Chapter 1 Administration
The administration chapter contains provisions for the application, enforcement and administration of the subsequent requirements. Maintaining "due process of law" in enforcing property maintenance criteria is a central theme of the chapter.

Amendments were made to clarify that legally established features and uses are allowed to be maintained in a structure according to the codes in effect when constructed.

Chapter 2 Definitions
All terms that are defined in the code are listed alphabetically. Where understanding of a term's definition is especially important for understanding a particular code provision, the term is shown in italics wherever it appears in the code.

Chapter 3 General Requirements
This chapter provides requirements that are intended to maintain a minimum level of safety and sanitation for both the general public and the occupants of a structure, and to maintain a building's structural and weather-resistance performance. Chapter three provides specific criteria for regulating the installation and maintenance of specific building components; maintenance requirements for vacant structures and land; requirements regulating the safety, sanitation and appearance of the interior and exterior of structures and all exterior property areas; accessory structures; vehicle storage regulations and establishes the party responsible for complying with the chapter's provisions. The chapter also contains the requirements for pools, spas and hot tubs and specifies how pool or hot tub barriers must be provided.

The amendments in chapter three are designed to make the scope of the IPMC consistent with the previously adopted housing code standards. Many sections which have been enforced through other provisions of the B.R.C. are deleted to avoid duplicate requirements related to weeds, rodent harborage, defacement of property and rubbish and garbage. In addition a section was added about how properties in the floodplain must be signed, to maintain consistency with Federal floodplain requirements.

Chapter 4 Light, Ventilation and Occupancy Limitations
This chapter sets minimum standards for occupancy and habitability by establishing the minimum criteria for light, ventilation, room size and ceiling height. The chapter also contains limitations on room arrangements such as a prohibition of one bedroom being accessed through another bedroom and limits building use to those that are compatible to residential uses.

The ventilation provision has been supplemented with an allowance for mechanical ventilation. An allowance for clothes dryer exhaust termination utilizing a lint trap for existing conditions has also been added.

Chapter 5 Plumbing Facilities and Fixture Requirements
The minimum criteria for the installation, maintenance and location of plumbing systems and facilities are included in chapter five. Sanitary building conditions are dependent upon plumbing principles which include providing potable water to a building, providing the basic fixtures to effectively utilize that water and properly removing waste from the building. The minimum criteria for verifying that sanitary building conditions will be maintained throughout the life of the building are contained in chapter five.

Chapter 6 Mechanical and Electrical Requirements
The minimum performance requirements for heating, electrical and mechanical facilities and minimum safety standards are addressed in chapter six.

The National Electrical Code (NEC) requirements related to ungrounded circuits and access to circuit breakers has been added. Requirements consistent with state carbon monoxide alarms were also added.

Chapter 7 Fire Safety Requirements
The fire safety related issues of how to exit a building in an emergency, and the active and passive fire resistance features of the building are addressed in chapter seven. The emergency egress window requirements are meant to provide an alternate path for occupants to get out of the building, and for firemen to gain entry if the conventional exit door is blocked by fire. Smoke and carbon monoxide alarm requirements are also addressed in chapter seven.

Chapter 8 Referenced Standards
A list of code related standards is provided in the last chapter of the PMC.

Appendix A Boarding Standard
Minimum prescriptive standards for installation of door and window "boarding" to prevent entry by unauthorized persons is provided in appendix B.

Appendix B Rental Housing Inspection and Licensing
The B.R.C. rental licensing requirements are referenced in Appendix A.

General Requirements

Weed control. Weed control is regulated and enforced under chapter 6-2, "Weed Control," B.R.C. 1981. (IPMC 302.4)

Motor vehicle parking and storage violations. Motor vehicle parking and storage are regulated and enforced by Title 7, "Regulation of Vehicle, Pedestrian and Parking," B.R.C. 1981. (IPMC 302.8)

Defacement of property. Graffiti control is regulated and enforced under chapter 5-4-14, "Graffiti Prohibited," B.R.C. 1981. (IPMC 302.9)

Premises identification. Buildings shall have approved address numbers placed in a position to be plainly legible and visible from the street or road fronting the property. (IPMC 304.3)

Roofs and drainage. The roof and flashing shall be sound, tight and not have defects that admit rain. Roof drainage shall be adequate to prevent dampness or deterioration in the walls or interior portion of the structure. Roof water shall not be discharged in a manner that creates a public nuisance. (IPMC 304.7)

Stairways, decks, porches and balconies. Every stairway (interior and exterior), deck, porch and balcony and all appurtenances attached thereto, shall be maintained structurally sound, in good repair, with proper anchorage and in safe condition. (IPMC 304.10 & 305.4)

Handrails and guards. Every interior and exterior handrail and guard shall be firmly fastened and capable of supporting normally imposed loads and shall be maintained in good condition. (IPMC 304.12 & 305.5)

Window, skylight and door frames. Every window, skylight, door and frame shall be kept in sound condition, good repair and weather tight. (IPMC 304.13)

Building security. Doors, windows or hatchways for dwelling units, rooming units or housekeeping units shall be provided with devices designed to provide security for the occupants and property within. (IPMC 304.18)

Accumulation of rubbish and garbage. All exterior property and premises, and the interior of every structure, shall be free from any accumulation of rubbish and garbage as required by chapter 6-3, "Trash, Recyclables and Compostables," B.R.C. 1981. (IPMC 308.1)

Disposal of rubbish and garbage. Every occupant of a structure shall dispose of all rubbish and garbage in a clean and sanitary manner by placing such rubbish and garbage in approved containers as required by chapter 6-3, "Trash, Recyclables and Compostables," B.R.C. 1981. (IPMC 308.2 & 308.3)

Pest Eradication

Rodent harborage. Rodent control is regulated and enforced under chapter 6-5, "Rodent Control," B.R.C. 1981. (IPMC 302.4)

Infestation. All structures shall be kept free from insect and rodent infestation. All structures in which insects or rodents are found shall promptly have the infestation eradicated by approved processes that will not be injurious to human health. After eradication, proper precautions shall be taken to prevent reinfestation. Rodent control is regulated and enforced under chapter 6-5, "Rodent Control", B.R.C. 1981. (IPMC 309.1)

Owner responsibility. The owner of any structure shall be responsible for eradication within the structure prior to renting or leasing the structure. (IPMC 309.2)

Single occupant responsibility. The occupant of a one-family dwelling or a single-tenant structure shall be responsible for eradication on the premises. (IPMC 309.3)

Multiple occupancy responsibility. The owner of a structure containing two or more dwelling units, a multiple occupancy or a rooming house shall be responsible for eradication in the public or shared areas of the structure and exterior property. If infestation is caused by failure of an occupant to prevent such infestation in the area occupied, the occupant shall be responsible for eradication. (IPMC 309.4)

Occupant responsibility. The occupant of any structure shall be responsible for the continued rodent and pest-free condition of the structure. Exception: Where the infestations are caused by defects in the structure, the owner shall be responsible for the eradication. (IPMC 309.5)

Pre-application pesticide notification. No operator or occupant shall fail to comply with the pre-application pesticide notification provisions of section 6-10-7, "Notification to Tenants and Employees of Indoor Application," B.R.C. 1981. (IPMC 309.6)

Flood Warning Signs

The owner and operator of every property located in the floodplain as detailed in chapter 9-3-3 (a) (10), B.R.C. 1981, and subject to a city rental license under chapter 10-3 "Rental Licenses," B.R.C. 1981, shall post and maintain on the exterior of the building at the entrance a sign approved by the code official stating that the property is subject to flood hazard (IPMC 310.1) in accordance with the following:

> The sign shall state: "This property is located in an area subject to sudden and severe flooding. In case of flood emergency be prepared to seek high ground immediately. For information go to www.boulderfloodinfo.net" or similar language.

The sign shall be a metal plaque with minimum ¼" letters in a contrasting color attached with non-removable fasteners on the exterior of the structure at the entrance.

Light, Ventilation and Occupancy Limitations

Habitable spaces light and ventilation. Every habitable space shall have at least one openable window. The total openable area of the window in every room shall be equal to at least 45 percent of the minimum glazed area required in Section 402.1. (IPMC 403.1)

Clothes dryer exhaust vent. Clothes dryer exhaust systems shall be independent of all other systems and shall be exhausted outside the structure in accordance with the manufacture's instructions. Exception: Listed and labeled condensing (ductless) clothes dryers. (IPMC 403.5)
Prohibited occupancy. Kitchens and non-habitable spaces shall not be used for sleeping purposes. (IPMC 404.4.4)

Plumbing Facilities and Fixture Requirements

Dwelling unit plumbing. Every dwelling unit shall contain its own bathtub or shower, lavatory, water closet and kitchen sink which shall be maintained in a sanitary, safe working condition. (IPMC 502.1)

Toilet room privacy. Toilet rooms and bathrooms shall provide privacy and shall not constitute the only passageway to a hall or other space, or to the exterior.
(IPMC 503.1)

Plumbing fixtures. All plumbing fixtures shall be properly installed and maintained in working order, and shall be kept free from obstructions, leaks and defects and be capable of performing the function for which such plumbing fixtures are designed. (IPMC 504.1)

Plumbing fixture clearances. Plumbing fixtures shall have adequate clearances for usage and cleaning. (IPMC 504.2)
Hot water to plumbing fixtures. Kitchen sinks, lavatories, laundry facilities, bath tubs and showers shall be supplied with hot or tempered and cold running water in accordance with the International Plumbing Code. (IPMC 505.1)

Water supply contamination. The water supply shall be maintained free of contamination, and all water inlets for plumbing fixtures shall be located above the flood-level rim of the fixture. Shampoo basin faucets, janitor sink faucets and other hose bibs or faucets to which hoses are attached and left in place, shall be protected by an approved atmospheric-type vacuum breaker or an approved permanently attached hose connection vacuum breaker. (IPMC 505.2)

Plumbing maintenance. Every plumbing stack, vent, waste, and sewer line shall function properly and be kept free from obstructions, leaks and defects. (IPMC 506.2)

Mechanical and Electrical Requirements

Heat supply temperature. Interior space intended for human occupancy shall have active or passive space-heating systems capable of maintaining a minimum indoor temperature of 68ºF (20ºC). No portable space heaters shall be used to achieve compliance with this section. (IPMC 602.3)

Room temperature measurement point. The required room temperatures shall be measured 3 feet above the floor near the center of the room and 2 feet inward from the center of each exterior wall. (IPMC 602.5)

Mechanical appliances. All mechanical appliances, fireplaces, fuel-burning appliances and water heating appliances shall be properly installed and maintained in a safe working condition, and shall be capable of performing the intended function. (IPMC 603.1)

Removal of combustion products. All fuel-burning equipment and appliances shall be connected to an approved chimney or vent. Exception: Fuel-burning equipment and appliances which are labeled for unvented operation. (IPMC 603.2)

Appliance clearances. All required clearances to combustible material shall be maintained. (IPMC 603.3)

Combustion air. A supply of air for complete combustion of the fuel and for ventilation of the space containing the fuel-burning equipment shall be provided for the fuel-burning equipment. (IPMC 603.5)

Duct systems. Duct systems shall be maintained free of obstruction and shall be capable of performing the required function. (IPMC 607.1)

Electrical system hazards. Where it is found the electrical system in the structure constitutes a hazard to the occupant or the structure by reason of inadequate service, improper fusing, insufficient receptacle and lighting outlets, improper wiring or installation, deterioration or damage, or for similar reasons, the code official shall require the defects to be corrected or eliminate the hazard. (IPMC 604.3)

Receptacle placement. Every habitable space in a dwelling shall contain at least two separate and remote receptacle outlets. Every laundry area shall contain at least one grounded-type receptacle or a receptacle with a ground fault circuit interrupter. Every bathroom shall contain at least one receptacle. Any new bathroom receptacle shall have ground fault circuit interrupter protection. (IPMC 605.2)

Light fixtures. Every public hall, interior stairway, toilet room, kitchen, bathroom, laundry room, boiler room and furnace

room shall contain at least one electric light fixture (luminaries). (IPMC 605.3)

Branch circuits in buildings with multiple residential occupancies. Each occupant shall have ready access to all circuit breakers protecting the conductors supplying that occupancy. (IPMC 605.4)

Extension cord uses not permitted. Flexible cords (extension cords) and cables (IPMC 605.5) shall not be used:

- As a substitute for the fixed wiring of the structure.
- Where run through holes in walls, structural ceilings, suspended ceilings, dropped ceilings or floors.
- Where run through doorways, windows, or similar openings.

Fire Safety Requirements

Safe means of egress. A safe, continuous and unobstructed path of travel shall be provided from any point in the building or structure to the public way. (IPMC 702.1)

Fire safety systems. All systems, devices and equipment to detect a fire, actuate an alarm, or suppress or control a fire are any combination thereof shall be maintained in an operable condition at all times in accordance with the International fire code. (IPMC 704.1)

Emergency escape openings. Required emergency escape openings shall be maintained in accordance with the code in effect at the time of construction, and the following. Required emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools. Bars, grills, grates or similar devices are permitted to be placed over emergency escape and rescue openings provided the minimum net clear opening size complies with the code that was in effect at the time of construction and such devices shall be releasable are removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. (IPMC 702.4)

Portable fire extinguishers. In new and existing R-1, R-2 and R-4 occupancies, portable fire extinguishers need only be installed when interior corridors and common areas exist in accordance with section 906.1 and table 906.3 (2) for light (low) hazard occupancies and sections 906.3 through 906.9. (IPMC 705.1.1)

BBQ safety. Charcoal burners and other open-flame cooking devices shall not be operated on combustible balconies or within 10 feet of combustible construction. (IFC 308)

Exception 1: One- and two-family dwellings.

Exception 2: Where buildings, balconies and decks are protected by an automatic sprinkler system.

Exception 3: LP-gas cooking devices having an LP-gas container with a water capacity not greater than 2 ½ pounds (nominal 1 pound LP-gas capacity).

Boulder Property Maintenance Code Smoke Alarm and Carbon Monoxide Alarm Requirements

Section 608: Carbon Monoxide Alarms

608.1 General. Carbon monoxide alarms are to be installed in existing residential structures in accordance with Colorado state law, including Title 38, Article 45, Carbon Monoxide Alarms, C.R.S.

608.2 Carbon Monoxide Alarms. Carbon monoxide alarms shall be installed in existing dwellings and rented single and multi-family dwellings that have fuel fired heaters, appliances or fireplaces or attached garages based on the following:

Alarms must be installed within 15' of the entrance to each sleeping area and must be wired to AC power, connected to an electrical panel, plugged into an electrical outlet without a switch, or if battery operated attached to the wall or ceiling per the manufacturer's installation instructions and in accordance with NFPA 70.

Alarms must be installed in existing rental dwellings upon change of tenant occupancy after July 1, 2009.
Alarms must be installed in all newly constructed or renovated single family and multi-family rental units.

Alarms may be installed within 25' of any fuel-fired heater or appliance, fireplace or garage entrance in a multi-family dwelling used for rental purposes ONLY if the multi-family dwelling is equipped with a centralized alarm system or other mechanism that allows a responsible person to hear the alarm at all times (commercially monitored system).

Rental owners are responsible for replacing non-functioning carbon monoxide alarms upon written request of the tenant or when the unit is being vacated and re-rented.
Carbon monoxide detectors shall not be disarmed, removed or have the batteries removed to make them inoperable.

608.3 Carbon monoxide alarm inspections. Carbon monoxide alarm inspections shall be conducted by the property owner or agent as detailed below.

Carbon monoxide alarms that receive their primary power from the building wiring shall be checked for good operat-

ing condition once each year and supplied with battery backup. The battery shall be replaced as necessary for proper function of the carbon monoxide alarm.
Battery-powered carbon monoxide alarms shall be tested for proper function on a semi-annual basis. Batteries shall be replaced as necessary for proper function of the carbon monoxide alarm.

Section 704: Fire Protection Systems

704.1 General. All systems, devices and equipment to detect a fire, actuate an alarm, or suppress or control a fire or any combination thereof shall be maintained in an operable condition at all times in accordance with the International Fire Code.

704.2 Smoke alarms. Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and in all dwellings not regulated in Group R occupancies, regardless of occupant load at all of the following:

On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms. In each room used for sleeping purposes.

In each story within a dwelling unit, including basements and cellars but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

Single- or multiple-station smoke alarms shall be installed in other groups in accordance with the international Fire Code.

704.3 Power Source. In Group R occupancies and in dwelling units not regulated as Group R occupancies, single-station smoke alarms shall receive their primary power from the building wiring provided that such wiring is served from a commercial source and shall be equipped with battery back-up. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Smoke alarms are permitted to be solely battery operated in buildings where no construction is taking place, buildings that are not served from a commercial power source and in existing areas undergoing alterations or repairs that do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawlspace or basement available which could provide access for building wiring without the removal of interior finishes.

704.4. Interconnections. Where more than one smoke alarm is required to be installed within an individual dwelling unit in Group R-2, R-3, R-4 and in dwellings not regulated as Group R occupancies, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. The alarm shall be clearly audible in all bedrooms over background noise levels with intervening doors.

Exception 1: Interconnection is not required in buildings which are not undergoing alteration, repairs or construction of any kind.

Exception 2: Smoke alarms in existing areas are not required to be interconnected where alterations or repairs do not result in the removal of interior wall or ceiling finishes exposing the structure, unless there is an attic, crawl space or basement available which could provide access for interconnection without the removal of interior finishes.

704.5 Residential rental smoke alarms. In R-occupancies governed by chapter 10-3, "Rental Licenses," B.R.C. 1981, smoke alarms shall be installed and inspected as required in this section.

704.6 Smoke alarm inspections. Smoke alarm inspections shall be conducted by the property owner or agent as detailed:

Smoke alarms which receive their primary power from the building wiring shall be checked for good operating condition once each year and if supplied with battery backup, the battery shall be replaced as necessary for proper function of the smoke alarm.

Battery-powered smoke alarms shall be tested for proper function on an annual basis. Batteries shall be replaced as necessary for proper function of the smoke alarm.

704.7 Fire Alarms. Fire alarms in existing residential structures shall be installed in accordance with chapter 10-8, section 903.7, "Fire Prevention Code," B.R.C. 1981.

Section 705: Portable Fire Extinguishers

705.1 Where Required. Portable fire extinguishers shall be installed as required by the City of Boulder Fire Code Section 906.

705.1.1. In new and existing R-1, R-2 and R-4 occupancies, portable fire extinguishers need only be installed when interior corridors and common areas exist in accordance with section 903.1 and table 906.3 (1) for light (low) hazard occupancies and sections 903.6 through 906.9.

Excerpted From Baseline Inspection Checklist (COBFC Sections 906.3 – 906.9)

Install fire extinguisher where access is not obstructed or obscured from view.

Install fire extinguisher with mounting bracket provided by the manufacturer.

Fire extinguisher installed in a cabinet shall not be locked unless subject to malicious use or damage.

Provide means for ready access for fire extinguisher locked in a cabinet.
The minimum rating for a fire extinguisher is 2-A.

A fire extinguisher is required on each floor level.

The maximum travel distance to a fire extinguisher is 75 feet.

The maximum height of a fire extinguisher is 5 feet above the floor.

City of Boulder Occupancy Limits and Posting Requirements

The City of Boulder's Ordinance No. 8072 requires that every operator of a rental property shall post conspicuously on the inside of the main entrance to each dwelling unit the maximum number of unrelated individuals permitted under section 9-8-5 B.R.C. 1981 ("Occupancy of Dwelling Units") in a form specified by the city manager.

Additionally this ordinance requires that each advertisement for a rental shall include a statement of the maximum occupancy by unrelated individuals permissible pursuant to section 9-8-5, B.R.C. 1981 of the dwelling unit to be rented. This ordinance is effective Jan. 4, 2016.

The posted sign should be protected and must measure at least 8.5 inches x 11 inches in size, with text measuring at least 3/8 inch tall and read "Maximum Permissible Unrelated Occupancy (##) by Ordinance No. 8072 and the Boulder Revised Code (B.R.C. 1981) 10-3-16. Per city code, this sign must remain visibly posted on the inside of the main entrance."

You may find a sample sign on the City of Boulder Rental Housing License website at:

www.bouldercolorado.gov/plan-develop/rental-housing-licensing

Property owners and property managers can find their legal allowed occupancy online by visiting http://gisweb.ci.boulder.co.us/agswebsites/pds/rentalinquiry and searching by the property address.

If the property address is not listed here, please refer to http://gisweb.bouldercolorado.gov/agswebsites/pds/pds_zoning/ to determine the zoning district of the property.

The allowed maximum legal occupancy for unrelated people are as follows: Up to three persons in P, A, RR, RE and RL zones; or up to four persons in MU, RM, RMX, RH, BT, BC, BMS, BR, DT, IS, IG, IM and IMS zones.

RENTAL UNIT SAMPLE LEASE DISCLOSURE LETTER

This is an important notice for tenants. Please read it carefully.

Every person who rents or leases a dwelling unit within the city limits of Boulder, Co. must be provided with information in accordance with the provisions of Boulder Revised Code, Section 12-2-4 (Ordinance 7158). Landlords are encouraged to make required disclosures at the time that lease agreements are executed in order to promote discussion of these city regulations. Landlords can, however, make required written disclosures at any time. It is not required that you use this letter to disclose the required city regulations. Many landlords prefer to include this information in their lease. Where leases are already in force, a letter to tenants explaining the relevant ordinances will fulfill the code requirement.

Landlords: DO NOT RETURN THE SAMPLE LEASE DISCLOSURE LETTER to the city. If you use it, keep it with your lease documents.

Occupancy Limits

A. The dwelling unit you will be renting or leasing at the address of:

_____

_____

may be occupied by no more than _____ unrelated persons. (Occupancy information can be obtained by calling 303.441.1880)

B. Under the current lease or rental agreement, the only people permitted to occupy the dwelling unit are:

_____

_____

C. City of Boulder laws permit a renter or lease holder to have a temporary house guest. However, if any guest becomes a resident of the apartment or dwelling unit, and if this produces a violation of the legal occupancy limit, a criminal prosecution can result.

D. Violations of the occupancy laws of the City of Boulder can result in criminal prosecution and fines of up to $2,000.00 for each day in violation.

Noise Ordinances

The City of Boulder has several ordinances that regulate noise. Violations of any of these ordinances can result in criminal prosecutions. A violation of any of these noise ordinances can result in criminal prosecution and a maximum fine of up to $1,000 and 90 days in jail. The laws include:

1. Disruption of Quiet Enjoyment of the Home, Section 5-9-5, B.R.C. 1981. This focuses on individuals who engage in loud behavior that disrupts a neighbor who is in his or her own house.

2. Unreasonable Noise, Section 5-9-6, B.R.C. 1981. This is a provision that can be used when officers, standing more than 100 feet away from a noise source, hear amplified music in a residential zone after 11 p.m.

3. Excessive Sound Levels, Section 5-9-3, B.R.C. 1981. This is based upon measuring sound levels with meters. Noise must not exceed 50 dBA between 11 p.m. and 7 a.m. in a residential zone. Late at night, the ambient or background noise level in most neighborhoods is approximately 35 dBA. A sound 15 decibels greater than the background noise (50 dBA), such as a loud stereo, will wake the average person from a deep sleep.

Fireworks Ordinances

Fireworks, Section 5-6-6, B.R.C. 1981. Except for police, military and certain other personnel described in Boulder's Code, it is illegal for anyone to possess fireworks in any public or private place or to explode fireworks anywhere with the City of Boulder without first having obtained a permit.

Nuisance Party Ordinances

A nuisance party is a gathering where one of a number of violations of Boulder's code provisions occurs. These include the unlawful consumption of alcohol, the unlawful provision of alcohol to minors, property damage, obstruction of traffic, public urination or the generation of excessive noise.

A nuisance party is also any party at which an open keg of beer is located in the front yard setback, on the front porch, or in an unscreened side yard, of a property.

Any person convicted of holding a nuisance party can be criminally prosecuted and sentenced to a fine of up to $1,000 and 90 days in jail.

Trash, Weed, and Snow Removal Ordinances

Trash Contract Required, Section 6-3-3(b), B.R.C. 1981. Every owner, manager, or operator of rental property is required to maintain a valid contract with a commercial trash hauler for the weekly removal of accumulated trash. You should understand the manner in which trash and recycling are to be dealt with at your rental unit.

Growth or Accumulation of Weeds Prohibited, Section 6-2-3, B.R.C. 1981. It is a violation to allow weeds to grow to a height greater than twelve (12) inches.

Duty to Keep Sidewalks Clear of Snow, Section 8-2-13, B.R.C. 1981. Occupants of residential units, along with property managers, are responsible to keep public sidewalks and walkways abutting their residential premises clear of snow. Snow must be removed by noon the day following a snow storm. Failure to remove snow may result in a citation and/or city contractor removing snow at the owner/tenants expense.

Parking On/Blocking Sidewalks

Parking on a Sidewalk Prohibited, Section 7-6-13(a)(1), B.R.C. 1981. No vehicle may be stopped or parked on a sidewalk or within a sidewalk area. This prohibits parking in a driveway in a manner that blocks a sidewalk.

Interest Due on Security Deposits

Interest Rates on Security Deposits, Sections BRC 12-2-2 and 12-2-7, B.R.C. 1981. Interest must be paid to tenants on any security deposit for residential leases.

I have read and understand these disclosures and potential consequences including that if I violate these city regulations, my tenancy can be terminated and I can be subject to eviction. This is be signed by every tenant, other than minor children living with a supervising parent or other custodian.

Tenant Signature Date

Tenant Signature Date

Tenant Signature Date

Tenant Signature Date

Tenant Signature Date

SmartRegs Guidebook

SmartRegs energy efficiency requirements for rental properties were adopted by the Boulder City Council on Sept. 21, 2010. The city's sustainability objectives met through these requirements include environmental health, economic vitality and social equity. By requiring a minimum level of energy performance, compliance with SmartRegs results in efficient residential rental properties that save energy. In addition, by establishing a minimum energy efficiency performance level, less efficient rental units are upgraded to meet this standard. Finally, by requiring property owners to upgrade rental properties, tenants have the potential to benefit from lower energy bills. As rental properties comprise approximately 50 percent of Boulder's housing stock, the SmartRegs requirements advance overall community sustainability objectives.

Scope

The SmartRegs ordinances became effective on Jan. 3 2011. The energy efficiency requirements for existing rental properties (Ordinance 7726) are required to be met by Jan. 2, 2019. This allows for an eight-year implementation period, the first three years of which (2011-2013) are marked by significant federal, state and local funding available to ease implementation cost to property owners. Rental units are encouraged to comply as early as possible. Beginning in January 2011, the City of Boulder and Boulder County are offering residential energy efficiency services specifically designed for SmartRegs compliance. For more information on these services and incentives please visit: **www.bouldercolorado.gov/LEAD** or call **303-441-3878**

Quick Notes

Jan. 3 2011: SmartRegs become effective

Jan. 2, 2019: Deadline for existing rental properties to meet requirements

2011-2013: Lots of funding available to help with implementation costs. Don't miss out!

Some buildings are exempt; see the info below.

Scope Exceptions

Exceptions to the scope are as follows:

1. Buildings that can be verified as meeting/exceeding the energy efficiency requirements of the Energy Conservation and Insulation Code, Chapter 10-7, B.R.C. 1981.

2. Any manufactured home.

3. Accessory Dwelling Units and Attached Owner Accessory Units as detailed in section 9-6-3, "Specific Use Standards Residential Uses." B.R.C. 1981.

Compliance Exceptions

Exceptions to compliance are as follows:

1. **Equivalent Performance:** Buildings achieving equivalent energy efficiency performance through the use of innovative materials, methods and/or equipment in accordance with the requirements of the ordinance. The code official will determine the relative values and effectiveness of innovative materials, methods and/or equipment in satisfying the intent and purpose of this code.

2. **Historic Buildings:** Upon a finding by the code official that the application of this section requires an exterior alteration to an individual landmark or a contributing building within an historic district established under chapter 9-11, "Historic Preservation," B.R.C. 1981, reasonable modifications in the award of prescriptive and performance points of this appendix that would not be eligible for a Landmark Alteration Certificate.

3. **Affordable Housing:** Rental dwelling units meeting the requirements for a permanently affordable unit, as follows:

A. Units weatherized after September 1994 according to state or federal subsidy program standards;

B. Units eligible for weatherization according to state or federal subsidy program standards that have applied for weath-

erization service: These units can be awarded an extension of one rental license cycle to reach compliance. The code official may approve additional time to achieve compliance if one rental license cycle is deemed to not be adequate;

C. Units not qualifying for weatherization according to state or federal subsidy programs: an exception for one rental license cycle to achieve compliance. The code official may approve additional time to achieve compliance if one rental license cycle is deemed to not be adequate.

4. **Technically Impractical**[1]**:** Buildings where energy efficiency upgrades are technically impractical in accordance with International Property Maintenance Code (IPMC) sec. 105.1. Owners shall demonstrate equivalent code compliance as :

A. Except as provided below owners shall make the energy efficiency improvements that are practical and shall purchase, for each rental license cycle, qualifying carbon offsets pro-rated for impractical improvements.

B. If the building is the subject of an application for concept review, site review or a demolition permit, and the application shows that the building will be demolished or substantially remodeled within the next licensing period, the owner need not make energy efficiency improvements, but must purchase, for each rental license cycle until the demolition or substantial remodel is complete, carbon offsets for the improvements not made.

Compliance

Property owners can comply with the energy efficiency requirements by following either a performance or prescriptive path.

Performance Path

The performance path requires a Home Energy Rating System (HERS) score of 120. The HERS index will be used for the verification of energy performance. A HERS rating shall be performed by a rater accredited by the Residential Energy Services Network (RESNET).

Prescriptive Path

The SmartRegs prescriptive path involves a checklist designed as an alternative to the SmartRegs performance path. The checklist relies on trained and certified Rental Energy Efficiency Inspectors (City of Boulder Class "G" license). To meet the requirements, each unit must achieve 100 checklist points in addition to two mandatory points in the water conservation category.

1. Technically Impractical and Qualifying Carbon Offsets—The ordinance as adopted does not require properties to comply until the end of 2018, data collected in the early years of program implementation will provide further guidelines to assist property owners in applying for a technically impractical exception. If a unit is approved for this option, the purchase of qualifying carbon offsets will be required at the time the unit is identified as technically impractical.

Contractor Licensing

In order to inspect properties for SmartRegs energy efficiency requirements, a contractor must have the following certifications and licenses:

1. Performance path: Home Energy Rater, accredited by the Residential Energy Services Network (RESNET).

2. Prescriptive path: City of Boulder "G" licensed contractor. To obtain a City of Boulder "G" license, the inspector must be certified through a city sponsored training program and have one of the following certifications:

COB licensed D-9 or General A, B or C contractor (ICC Certified), OR
Qualified Licensed Design Professional (Architect or Engineer), OR
ICC Certified Combination Inspector, OR
ASHI or NAHI Certified Home Inspector, AND/OR
ICC Certified Residential or Commercial Energy Inspector, OR
RESNET Certification

More information on trainings and a list of certified inspectors can be found at www.bouldercolorado.gov/smartregs.

SmartRegs **Energy Efficiency Application**

Please note: The application for energy efficiency compliance is also available in a web-based platform for licensed inspectors. Completed paper applications should be submitted to Park Central, 3rd Floor, 1739 Broadway.

Rental Property Address _____Apt/Unit #_____

Number of Dwelling Units_____ Number of Rooming Units_____

PROPERTY OWNER: _____

First Name Middle Initial Last Name

_____

Address

_____

City State Zip Code

_____ _____

Telephone Number Email Address (required)

LOCAL AGENT: A property owner who does not reside in Boulder County shall appoint a person who lives in Boulder County to serve as the local agent of the owner.
B.R.C. 1981, Section 10-3-14.

_____

First Name Middle Initial Last Name

_____

Address

_____

City State Zip Code

_____ _____

Telephone Number Email Address (required)

**Correspondence concerning this property should be sent to: ☐ Owner ☐ Agent

INSPECTOR:

_____

Full Name License No.

_____

Telephone Number Email Address

SmartRegs Energy Efficiency Requirement

1. Please check one pathway below (performance OR prescriptive) and fill in the appropriate values.
2. For the performance pathway, accompanying documentation must include a HERS rating certificate produced by a certified HERS rater.
3. For the prescriptive pathway:
    a. Information for each dwelling unit must be submitted. If this application is for one dwelling unit, please just use the first line.
    b. A certified inspector must complete, print and sign the supporting documentation for the prescriptive list (see page 8). This documentation must be submitted with this application.

☐ Performance path

Property Address	Initial HERS Score	Final HERS Score*

**The final HERS score must be less than or equal to 120.*

☐ Prescriptive path Did this property utilize the EnergySmart service? ☐ Yes ☐ No

Unit or House Number	Base Points	Final Points**

***The final points must be greater than or equal to 100.*

Exemptions

Some properties are exempt from the energy efficiency requirements of this ordinance. Please check the appropriate box below and await verification of exemption from the City of Boulder.

☐ Buildings that meet/exceed the energy efficiency requirements of the Energy Conservation and Insulation Code, Chapter 10-7, B.R.C. 1981. (typically buildings permitted after July 2001)

☐ Any manufactured home.

☐ Accessory Dwelling Units and Attached Owner Accessory Units as defined in section 9-6-3, "Specific Use Standards Residential Uses." B.R.C. 1981.

☐ Units weatherized after September 1994 according to state or federal subsidy program standards. Documentation of participation required.

CONTINUED

+Optional Additional Questions

Answers to the following questions are requested in order to help the city evaluate the impact of the new regulations. The answers to these questions will be compiled and presented to City Council in an aggregate and anonymous format. Your responses will help shape any future adjustments needed to maximize program effectiveness and are greatly appreciated.

1. Please provide the per unit retrofit cost to comply with this requirement.

2. Did this property require any lead based paint mitigation for the retrofits specific to this requirement? If yes, please provide an estimate of the cost increase due to lead based paint mitigation.

3. Were any rebate dollars employed for the retrofit measures? If yes, please list the source, measure, and dollar amount.

Rebate Source (e.g. Xcel Energy)	Measure (e.g. Insulation)	Dollar amount of rebate

4. Were any financing mechanisms employed for retrofit measures? If yes, please provide lender and amount of retrofit financed.

I, the Owner/Agent for the above property, do hereby affirm that information submitted to comply with the SmartRegs Energy Efficiency requirements for the above property is correct.

_____ _____

Signature Date

Photo by Glenn Asakawa

SmartRegs Prescriptive Path

The SmartRegs Prescriptive Path worksheet can be found on the following pages. Each dwelling unit must achieve 100 points from this list. An additional 2 points are required in the water conservation category.

How to fill this out and submit the documentation: A worksheet is available: www.bouldercolorado.gov/smartregs. Inspectors should download the worksheet and fill out the base points in each category. The worksheet will configure a list of recommendations based on the base points by automatically calculating the largest potential point increases to reach compliance. The list will be sorted with lowest cost measures as primary recommendations. These recommendations are based on a set of general assumptions and should be used as a guide rather than an actual work scope for the unit. Each unit should work with a contractor to identify the priority measures specific to each unit for a more tailored route to compliance.

Once final inspection is completed, the inspector should fill in the final points in the worksheet, sign, and submit to property owner to include in their application to the city.

SmartRegs Technical User's Guide

The SmartRegs Prescriptive Path is an alternative to the SmartRegs Performance Path which requires that a rental unit ("Unit") achieve a Home Energy Rating System (HERS) Index of 120. The basis of the Prescriptive Path is the SmartRegs Prescriptive Checklist ("Checklist") which was designed to achieve a similar level of energy performance as the Performance Path. The Prescriptive Pathway is technical in nature and is designed for use by a City of Boulder licensed third-party inspector who must receive training from the City on the proper application of the Checklist. In order to maintain consistent Checklist scoring, the following Technical User's Guide was developed to provide instruction on the proper assessment and scoring protocols.

Compliance Process Overview

1. Inspector performs initial blower door testing, duct leakage testing (where applicable) and completes the SmartRegs Checklist to determine "Base" points. Where a Unit scores 100 points or above at the "Base" inspection, the Inspector will certify that the Unit has met the requirements of the SmartRegs Ordinance.

2. Where the Unit has less than 100 Base points, the owner should consider the costs and benefits of various available improvement options and determine the Unit's compliance pathway to 100 points.

3. Following implementation of improvements, the Inspector revisits and completes the Checklist to determine the "Final" points. The final inspection may include retesting of air infiltration or duct leakage where the owner is trying to achieve more points in these categories.

Determining Points Via Tables

In general, the Checklist consists of a series of tables containing specifications of building components typical to the majority of the rental housing stock. In cases where the object of a section is a single data point, such as primary heating system efficiency, the Inspector should first determine the actual system efficiency.

AHRI CERTIFIED
www.ahridirectory.org

This furnace qualifies for AFUE Federal Energy Efficiency Tax Credit when placed in service between February 17 2009 and December 31 2010.

Certificate of Product Ratings

AHRI Certified Reference Number: 2008415 Date: 11/8/2010

Product: Residential Furnace Heating Equipment
Model Number: TUH1B040A9241A*
Manufacturer: TRANE
Trade/Brand name: XR 95

Rated as follows in accordance with Department of Energy (DOE) furnace test procedures as published in the latest edition of the Code of Federal Regulations, 10 CFR Part 430 and subject to verification of rating accuracy by AHRI-sponsored, independent, third party testing:

AFUE: 95.0% ◂ EXAMPLE
Output Heating Capacity: 38 MBTUH

Quick Notes

Prescriptive Path: An alternative to the Performance Path; To be used by City of Boulder licensed, third-party inspectors

100 Points: A unit must score 100 or more base points to be compliant.

The Checklist: Allows for a less time-intensive "checklist audit"

After determining the actual level of efficiency, the Inspector should find the most appropriate categorical value from the first row of the HEATING Table. In most cases, the Inspector will need to round the actual value to apply the Checklist. In general, for each building component on the Checklist points are determined by rounding up or down to the nearest available increment. This Guide offers instructions on the proper way to perform the rounding exercise for each type of building component. In the case of a 95% AFUE furnace, the Inspector would round up to 96% AFUE and award 19 points, as indicated in the column to the right of the category.

HEATING Base: 19 Final:

SPECIFICATION	POINTS
Electric, Oil, or ASHP	0
Gas 65 AFUE or worse	0
Gas 80 AFUE	13
Gas 90 AFUE	17
Gas 96 AFUE	19
GSHP (COP 3.3)	29
GSHP (COP 4.1)	38
GSHP (COP 4.8)	43

In the case of a building component that may be comprised of multiple data points, such as the insulation value of walls, there are additional columns to allow the Inspector to account for multiple wall locations or assembly types. In these cases, the Inspector assigns points based upon estimated percentages of wall area for each category. For each section, the Inspector rounds to the nearest 25%.

In the example below, of the Unit's total wall area, 75% is above-grade and 25% is below grade in a finished basement. All of the walls are framed with 2 x 4's, including the furred wall in the finished basement. Of the above-grade walls, 2/3 were insulated during a renovation but 1/3 remains uninsulated. Therefore, the walls can be divided into the following three categories:

25% - above-grade, 2 x 4 wall, uninsulated,
50% - above-grade, 2 x 4 wall insulated to R-13, and
25% - insulated basement wall.

A Decision-Making Tool

That configuration would be shown on the Checklist as:

WALLS Base: 16 Final: ____

R-VALUE	25%	50%	75%	100%
No Insulation	0	0	0	0
R-3 Continuous (must be at least R-3)	3	6	9	12
R-5 Continuous	4	8	12	15
R-13 or Uninsulated Basement Wall	5	10	15	20
R-19 or Better	5	11	16	21
Shared Wall or Insulated Basement Wall	6	13	19	26

If the owner were to add insulation to the uninsulated walls, the Checklist for the final inspection would appear as follows.

WALLS Base: 16 Final: 21

R-VALUE	25%	50%	75%	100%
No Insulation	0	0	0	0
R-3 Continuous (must be at least R-3)	3	6	9	12
R-5 Continuous	4	8	12	15
R-13 or Uninsulated Basement Wall	5	10	15	20
R-19 or Better	5	11	16	21
Shared Wall or Insulated Basement Wall	6	13	19	26

The Prescriptive Checklist functions as a decision-making tool for homeowners, auditors and retrofitters to identify the home-specific "low-hanging" fruit and turn "audits into action." Currently, most home energy efficiency programs for existing homes only award points for making improvements, but do not reward a home's existing conditions that enhance home energy performance. Under such a program, many homeowners would have to increase the energy efficiency of an already well-performing home to receive the same certification as a less-efficient home that made the same improvements.

The SmartRegs Prescriptive Pathway is fundamentally different: it functions as a simple "checklist audit," awarding and weighting points in much the same way as a performance-based approach. Under the Prescriptive Checklist, each home gets points for the performance of its existing systems and components. In addition, with a less time-intensive Checklist audit (compared to a full HERS rating) and simple air infiltration testing, landlords can clearly see the areas where energy upgrades are most needed. The design of the Prescriptive Pathway also allows landlords to weigh the potential impact and prioritize various improvement measures by comparing the cost and the additional points that would be earned. The formula is simple: the more points that a home can earn for a measure, the more impact that measure has on its overall carbon emissions.

Applying the Checklist Section 1: Walls

Step 1

Locate the Thermal Boundary

When completing the Checklist, Inspectors need only evaluate those walls that constitute the Unit's thermal boundary. Any partition walls that exist entirely within the thermal boundary of the Unit are to be ignored. Once the walls that comprise the Unit's thermal boundary have been identified, proceed to the following steps considering only those walls.

Step 2

Establish Wall Location

Shared Walls: Because heat transfer across a wall that separates two conditioned spaces is generally insignificant relative to heat transfer across other thermal boundary walls, the Inspector must determine which, if any, walls in the Unit are "shared walls" (also known as "adiabatic walls" or "demising walls"). For the purposes of the Checklist, in order to be considered a shared wall, the space on the opposite side of the evaluated wall must maintain a temperature (via thermostat control) that is reasonably similar to the temperature within the Unit. In other words, walls that separate the Unit from another residential dwelling, conditioned corridor, conditioned common space, or a conditioned commercial space should be considered shared walls. On the other hand, walls that separate the Unit from an unconditioned or occasionally conditioned space such as a garage or workshop should not be considered shared walls. Similarly, walls that separate the conditioned living space within the Unit from an unconditioned crawl space or basement should not be considered shared walls.

Quick Notes
Walls

Thermal Boundary: Only thermal boundary walls need to be evaluated; Ignore partitions

Wall Location: Determine if walls are shared/not shared or insulated/uninsulated basement

Wall Construction: Identify framing material, any remodeling indicators, cavity insulation and/or continuous insulating material (if present)

Basement Walls: Like shared walls, thermal boundary walls that separate conditioned living space from ambient earth are subject to different conditions than those that separate conditioned living space from ambient air. The Inspector must determine which, if any, walls are in part or entirely below-grade. On the Checklist, these walls are identified as "Basement Walls." This wall type is further divided into "Uninsulated Basement Wall" and "Insulated Basement Wall" categories. Basement wall assemblies containing any insulation, whether exterior or interior, continuous or located within the framing cavities of an interior furred wall, shall be considered insulated basement walls.

Step 3

Establish Wall Construction Characteristics

Evaluating the thermal performance characteristics of wall assemblies in existing structures can be challenging because it is not generally feasible to observe the presence, type, and/or quality of insulating materials that may be concealed within the wall cavities or behind the exterior cladding. In order to find the most appropriate Checklist categories for the exterior wall types, the Inspector must determine the following:

Is the wall constructed with 2 x 4 framing members or 2 x 6 framing members? This is usually most easily determined by examining the jamb of a window or door located within the wall in question. By determining the depth of the jamb, the depth of the internal framing can generally be deduced. A standard jamb for a window or door set in a 2 x 4

framed wall is 4-9/16" wide. A standard 2 x 6 jamb is 6-9/16" wide. If there are no windows or doors in a given wall, or if this test is otherwise impracticable, the cavity depth can be determined by removing an outlet or switch cover plate, then passing a barbed, non-conductive probe (nylon knitting needles make great wall probes) between the electrical box and the adjacent drywall. Taking great care not to touch the wires or contacts within the electrical box, slide the probe into the wall cavity, perpendicular to the plane of the wall, until it comes into contact with the inside face of the exterior wall sheathing. Mark the depth on the probe and withdraw it from the wall. If the mark is ~4" from the end of the probe, then the wall is likely constructed with 2 x 4 studs. If the mark is ~6" from the end of the probe, then the wall is likely constructed with 2 x 6 studs.

As many Boulder structures have had additions and/or remodels over the years, do not assume that because you have established the framing type for one wall, that the characteristics of all walls are known. Be mindful to look for indications of additions or remodels (e.g. changes in wall texture, changes in flooring material, updated windows, updated fixtures, etc.) that may hint at the presence of multiple types of wall assemblies in the same Unit. Additions or remodels that occurred after 1990 are more likely to feature 2 x 6 wall construction due to the building codes in force at the time the work was performed.[1]

Do the framing cavities contain insulation? Using the following procedure, the Inspector must determine whether or not the wall cavities contain insulation.

First, remove at least one of the following from every non-shared wall type that has been identified within the Unit:

- Light switch cover plate
- Electrical outlet cover plate
- Coaxial cable jack cover plate
- Register cover
- Phone jack cover plate
- Any other easily removable cover that gives access to the cavity behind the drywall.

Second, locate an opening large enough that a non-conductive probe may be passed into the wall cavity. In the event that the drywall fits very tightly against the electrical box, coaxial cable, etc., lightly trace the cover with a pencil to determine whether or not the opening could be enlarged sufficiently to allow the probe to pass into the wall cavity while still being hidden by the cover when it is replaced.

Third, pass the probe into the wall cavity, taking care to avoid contact with electrical wires or contacts, then attempt to snag any insulating material that may be located within the wall cavity. Carefully remove the probe in order to identify the presence and type of insulating material caught on the barb. Insulating materials most commonly found in wall cavities in Boulder include fiberglass batts, rockwool batts, or blown cellulose[2].

Is there fibrous insulating sheathing, continuous exterior rigid insulation board or insulated siding present? There are several reasons why a wall may be constructed with a continuous insulating material. Inspectors may find fibrous insulating sheathing board as a common component of wall assemblies. This material is common in Boulder structures constructed in the post-WWII building boom spanning from the late 1940's to the late 1960's. The presence of this material is most commonly discovered by observing an area of wall that lacks interior finish such as an unfinished mechanical room or an exterior gable end wall viewed from inside the attic. Per Table 1.2, the presence of a 1/2" layer of fibrous insulating board used as wall sheathing does not, on its own, qualify for any points on the Checklist.

Determining the presence of continuous exterior rigid insulation board or insulating siding will generally be accomplished from outside. The easiest way to identify the presence of these products above is to observe the intersection of the exterior sheathing/siding and the foundation walls. Because walls are generally designed such that the outside face of the framing members is coplanar with the outside face of the foundation walls, any exterior rigid insulation board can generally be observed by bending down to view the bottom edge of the wall sheathing. If a rigid insulation board material is observed, calculate the material's R-value by multiplying its depth by the RMaterial value from Table 1.2 on page 49.

Insulating siding products have been available since the late 1970's and typically consist of a standard aluminum or vinyl siding material that is bonded to a piece of rigid foam insulation (usually expanded polystyrene) backing material that matches the profile of the siding. These products' performance values generally range between R-3 and R-4. In the absence of manufacturer's data or a visible label indicating the material's R-value, the performance must be calculated by multiplying the average material depth by the RMaterial value from Table 1.2.

1. Bear in mind that 2 x 4 and 2 x 6 framing members are given as nominal, not actual, dimensions. In other words, for framing members manufactured after 1960, a "2 x 4" stud is actually 1-1/2" wide and 3-1/2" deep while a "2x6" stud is 1-1/2" wide and 5-1/2" deep. Those manufactured prior to 1960 may be closer to true 4" or 6" depths. Also, drywall thicknesses vary between 1/2", 5/8", and, in some fire-rated assemblies, 1". In some cases there may be a layer of exterior rigid insulation that gives the studs and jambs a deceptively wider appearance. This condition is addressed further in the insulation section.

2. Another hint to the presence of cavity insulation may be the discovery of kraft paper insulation facing that is visible in the cavity or caught on the probe's barb. Kraft paper-faced fiberglass or rockwool batts are common.

Step 4

Determine the Most Appropriate R-Value

For each wall type identified above, an appropriate R-Value must be selected from the Walls section of the Checklist. The Checklist offers a limited range of insulation values, so the Inspector must mark which value most nearly coincides with the observed characteristics of each wall type. The categories are defined as follows:

No Insulation: Any wall construction type that has no cavity insulation and either no continuous exterior insulation or continuous exterior insulation with an R-value less than 3. Examples: Exposed double-wythe brick walls, framed walls with no cavity insulation (including those with fibrous insulating sheathing board), or uninsulated concrete masonry walls.

>R-3 Continuous: Any wall construction that has no cavity insulation and exterior continuous insulation with an R-value between 3 and 4. Examples: Framed walls with insulated siding, framed or masonry walls with 1/2" polyisocyanurate continuous exterior insulation, and/or framed or masonry walls with 1" thick expanded polystyrene continuous exterior insulation.

R-5 Continuous: Any wall construction that has no cavity insulation and exterior continuous insulation with an R-value between 4 and 7. Examples: Framed or masonry walls with 1" extruded polystyrene continuous exterior insulation, framed or masonry walls with 1" polyisocyanurate continuous exterior insulation, or framed walls with 1/2" fibrous insulation sheathing board and R-3.5 insulated siding.

R-13: Any above-grade, 2 x 4 wall containing cavity insulation of any type other than closed-cell spray foam. Examples: 2 x 4 walls w/rock wool batts, fiberglass batts, dense-packed cellulose, or dense-packed fiberglass.

Uninsulated Basement Wall: Any uninsulated wall, or portion of a wall, that separates the conditioned living space of the Unit from ambient earth. Examples: Concrete or masonry foundation walls (exposed on the interior) with no exterior rigid insulation between the concrete and the adjacent earth, concrete or masonry foundation walls with interior furring but no cavity insulation and no exterior insulation, or rubble foundation walls.

>R-19: Any above-grade, 2 x 6 wall completely filled with cavity insulation of any type. Examples include: 2 x 6 walls with fiberglass batts, dense-packed cellulose, or dense-packed fiberglass.

Shared Wall: Any wall determined to be located between the Unit and another conditioned space (defined in greater detail above).

Insulated Basement Wall: Any insulated wall, or portion of a wall, that separates the conditioned living space of the Unit from ambient earth. Examples include: concrete or masonry foundation walls with exterior rigid insulation between the wall and the adjacent earth, or concrete or masonry foundation walls with interior furring containing any type of cavity insulation.

Other Wall Types: In the event that a wall assembly is encountered that does not appear to align with any of the categories prescribed on the Checklist, the wall assembly's U-Value may be calculated and points may be assigned using Table 1.1 - Wall Points U-Value Alternate. Wall assembly U-Values shall be calculated using the process outlined in Appendix A.

Step 5

Assign Appropriate Percentages

Where multiple wall types are present within the Unit, their thermal performance characteristics must be assigned according to their representative portion of the total wall area. In order to maintain the simplicity of the Checklist, this value is divided into 25% increments. In reality, a given Unit may have more than four different wall types. In these cases the four most dominant types, by area, must first be identified. Then, rounding the nearest categorical value, the wall types must be assigned a presence of either: 0%, 25%, 50%, 75%, or 100%. The sum of the percentages indicated on the Checklist must equal 100%.

Step 6

Determine the Appropriate Number of Points

Assign the appropriate points for this section according to the procedure detailed in the introduction to the Technical User's Guide. For walls where the U-Value was calculated according to the procedures detailed in Appendix A, points shall be assigned according to Table 1.1.

Table 1.1–Wall Points U-Value Alternate

WALLS Base:_____ Final:_____

U-VALUE	25%	50%	75%	100%
≥ 0.148	0	0	0	0
0.147 – 0.128	3	6	9	12
0.127 – 0.097	4	8	12	15
0.096 – 0.061	5	10	15	20
0.060 – 0.040	5	11	16	21
≤ 0.039	6	13	19	26

Table 1.2–Insulating Materials

Rigid Board	
Material	$R_{Material}$ (R-Value per Inch of Depth)
Fibrous Insulating Sheathing Board (Tuff-R or similar) – first layer	1.6 (improvement over plywood)
Fibrous Insulating Sheathing Board – any additional layers	2.5
Expanded Polystyrene (molded beads) – EPS	3.9
Extruded Polystyrene (blue or pink board or similar) - XPS	5.0
Cellular Polyisocyanurate (typically foil-faced)	6.5 (aged)

Batts	
Material	$R_{Material}$
Rock Wool (Loose or Batt)	3.0
Fiberglass Batt (Typical)	3.1

Loose Fill / Blown-In	
Material	$R_{Material}$
Loose Fiberglass	3.2
Dense-Packed Fiberglass	4.2
Loose Cellulose	3.3
Dense-Packed Cellulose	3.7

Spray Foam	
Material	$R_{Material}$
Open-Cell Polyurethane Foam	3.6
Closed-Cell Polyurethane Foam	6.8

Section 2: Windows / Fenestration

Step 1

Locate All Windows and Doors

All windows, skylights and doors located within the thermal boundary of the unit must be identified.

Step 2

Determine Predominant Fenestration Types

Windows, skylights and doors must be included in the Checklist category that most nearly resembles windows characteristics. In the event that opaque doors represent 25% or more of the total fenestration area, the predominant door type should

Quick Notes Windows

Thermal Boundary: All windows (including skylights and relevant doors) in the thermal boundary must be evaluated.

Predominant Types: If a Unit has more than four window/door types, the four most dominant types, by area, must first be identified.

be categorized according to its National Fenestration Rating Council (NFRC)-rated U-Factor or according to the equivalents provided in Table 2.1 (right). The Checklist provides the following window/fenestration types:

Single Metal (1.20 U-Factor): Windows constructed of a single layer of glass within a frame that consists primarily of a metal material (typically aluminum or steel). Any window or door with a determined U-Factor of 1.09 or greater shall be placed in this category.

Single Non-Metal (0.95 U-Factor): Windows constructed of a single layer of glass within a frame that consists primarily of a non-metal material (typically wood or vinyl). Any window or door with a determined U-Factor that ranges from1.08 to 0.89 shall be placed in this category.

Double Metal (0.80 U-Factor): Windows constructed of two layers of glass within a frame that consists primarily of a metal material (typically aluminum or steel). Any window or door with a determined U-Factor that ranges from 0.88 to 0.69 fits this category.

Double Non-Metal (0.55 U-Factor): Windows constructed of two layer of glass within a frame that consists primarily of a non-metal material (typically wood or vinyl). Any window or door with a determined U-Factor that ranges from 0.68 to 0.46 shall be placed in this category.

0.35 U-Factor: Windows or doors with NFRC-rated U-Factors that range from 0.45 to 0.33. Residential-type windows that have been installed since June, 2001 for which there is no available NFRC or manufacturers' data shall be categorized as 0.35 U-Factor windows.

Additionally, historically designated properties and properties older than 50 years with wooden window frames that rehabilitate and install storm panels will receive credit at the 0.35 U-Value level.

0.30 U-Factor: Windows or doors with NFRC-rated U-Factors that range from 0.32 to 0.26. Windows installed since 2010 that are ENERGY STAR qualified will have a U-Factor in this category or better.

<0.25 U-Factor: Windows or doors with NFRC-rated U-Factors that are 0.25 or less.

Step 3

Assign Appropriate Percentages

Where multiple fenestration types are present within the Unit, their thermal performance characteristics must be assigned according to their representative portion of the total window and door area. In the event that a given Unit has more than four window/door types, the four most dominant types, by area, must first be identified. Then, rounding the nearest categorical value, the window/door types must be assigned a presence of either 0%, 25%, 50%, 75%, or 100%. The sum of the percentages indicated on the Checklist must equal 100%.

Table 2.1 - Door/Window Equivalent Defaults

Door Type	Default Category
Uninsulated Metal	Single Metal
Uninsulated Metal w/ Storm	Single Metal
Insulated Metal	Double Non-Metal
Insulated Metal w/ Storm	Double Non-Metal
Wood	Double Non-Metal
Wood w/ Storm	Double Non-Metal
Insulated Non-Metal	0.35 U-Factor
Insulated Non-Metal w/ Storm	0.35 U-Factor

Step 4

Determine the Number of Points

Assign the appropriate number of points for this section according to the procedure detailed in the introduction to this user's guide.

Section 3: Ceilings

Step 1

Locate the Thermal Boundary

The Inspector must identify each of the flat and/or vaulted ceilings that constitute the upper portion of the Unit's thermal boundary. The Inspector should classify any portion of the Unit's thermal boundary that has a slope of 45° or less as a ceiling. Portions of the Unit's thermal boundary that have a slope of 46° or greater should be classified as walls. Any floor/ceiling assemblies that exist entirely within the Unit's thermal boundary are to be ignored. Once the ceilings that comprise the Unit's thermal boundary have been identified, proceed to the following steps to evaluate only those ceilings.

Step 2

Establish Ceiling Location

Shared Ceilings: Because heat transfer across a boundary that separates two conditioned spaces is generally insignificant relative to heat transfer across other thermal boundary areas, the Inspector must determine which, if any, ceiling areas in the Unit are "shared ceilings". For the purposes of the Checklist, to be considered a shared ceiling the space on the opposite side of the evaluated ceiling must maintain a temperature (via thermostat control) that is reasonably similar to the temperature within the Unit. In other words, ceilings that separate the Unit from another residential dwelling, a conditioned corridor, conditioned common space, or a conditioned commercial space should be considered shared ceilings. On the other hand, ceilings that separate the Unit from an unconditioned space such as an attic or deck should not be considered shared ceilings. Similarly, dropped or under-framed ceilings that separate the living space from a conditioned attic space should be ignored as they are not part of the Unit's thermal boundary.

Step 3

Establish Ceiling Const. Characteristics

For those ceilings that are not considered shared ceilings, their thermal performance characteristics must be determined. Evaluating these characteristics in an attic-type assembly can generally be accomplished by locating an attic access hatch and observing the ceiling insulation from above. In some cases the attic may only be accessible via a hatch or vent on the building's exterior or via a hatch located in another Unit. Vaulted or cathedral ceilings present a greater challenge as their cavities are generally not accessible, much like an exterior wall. In order to assign the appropriate points in this section, the Inspector should determine:

Is the Ceiling an Attic-type or Vaulted Assembly? Attic-type ceiling assemblies are those where the inside face of the roof sheathing is substantially removed from the top face of the framing members that support the ceiling finish material. In a vaulted ceiling assembly, the inside face of the roof sheathing material is typically in direct contact with the top face of the framing members that support the ceiling finish. In general, an attic-type assembly will allow a layer of insulating material to lie continuously over the top of the framing members that support the ceiling finish material where vaulted ceiling assemblies cannot accommodate any layers of continuous insulation unless that material is installed against the outside face of the roof sheathing material.

Step 4

Determine the Most Appropriate R-Value

For each ceiling assembly identified above, an appropriate category must be selected from the Ceilings section of the Checklist. The Checklist offers a limited range of insulation values, so Inspectors must determine which value most nearly coincides with the observed characteristics of each identified ceiling type. The categories are defined as:

For Attic-type Assemblies: Access the attic area via the attic hatch or an exterior vent. Determine the type(s) of insulation present and establish the associated depths. Be sure to note the depth and spacing of the ceiling's framing members that may be concealed beneath the insulation.[1]

Assign the Appropriate R-Value. Based on the assessment, determine the appropriate R-Value from the Checklist. The categories are defined as follows:

No Insulation: Attic is uninsulated

R-19: Attic is insulated with material labeled as achieving R-19

R-30: Attic is insulated with material labeled as achieving R-30

>R-38: Attic is insulated with material labeled as achieving R-38 or greater

Other Ceiling Types: Where no label is visible or where the attic is insulated in part or entirely with loose fill material, the attic assembly's U-Value may be calculated and points may be assigned using Table 3.5 - Ceiling Points U-Value Alternate. The ceiling assembly U-Value shall be calculated using the process outlined in Appendix B.

1 In some cases, there may be an inaccessible attic space either because no access is available or because the access hatch is located inside another unit. When the access is located within another unit, the Inspector should work

Quick Notes
Ceilings

Thermal Boundary: Any portion of the thermal boundary with a slope of 45° or less is a ceiling.

Vaulted Ceilings: Evaluating vaulted ceilings can be tricky. The process is similar to that of evaluating walls.

Predominant Types: The four most dominant ceiling types, by area, must first be identified.

For Vaulted Ceiling Assemblies: Assessing the thermal characteristics of a vaulted ceiling assembly presents the same challenges as assessing existing walls. As such, the process is very similar to that performed in the wall section above. Vaulted ceiling assemblies should be assessed by:

A. Determine the framing depth because there usually are not any fenestration penetrations through a vaulted ceiling, determining the depth of the framing members is usually not possible without probing the ceiling cavity. Even where there is a skylight present, the depth of the ceiling framing can be difficult to ascertain because skylights are generally mounted on a curb that gives the ceiling assembly a deceptively thick appearance.

In some cases it may be possible to assess the depth of a vaulted ceiling's framing members by observing the eaves or outriggers at the Unit's exterior. Generally, however, vaulted ceiling framing depth should be determined by removing a light fixture or duct register cover, and then passing a non-conductive probe between the electrical box or duct boot and the adjacent drywall. Taking great care not to touch the wires or contacts within the electrical box, slide the probe into the ceiling cavity, perpendicular to the plane of the ceiling, until it comes into contact with the inside face of the exterior roof sheathing. Then mark the depth on the probe and withdraw it from the ceiling. If the mark is ~8" from the end of the probe, then the ceiling is likely constructed with 2 x 8 rafters. If the mark is ~10" from the end of the probe, then the ceiling is likely constructed with 2 x 10 rafters, and so on.

As many Boulder structures have had additions and/or remodels, do not assume that because you have established the framing depth for one vaulted ceiling type, that you know the characteristics of all vaulted ceilings. Look for indications of additions or remodels (e.g. changes in ceiling texture, flooring material, updated windows, newer fixtures, etc.) that may hint at the presence of different ceiling construction in certain areas.

B. Determine if framing cavities contain insulation. With the following procedure, the Inspector must determine whether or not ceiling cavities contain insulation. Remove at least one of the following from every non-shared, vaulted ceiling type that has been identified within the Unit: light fixture base; register cover; or any other easily removable cover that gives access to the cavity behind the ceiling finish material.

Locate an opening large enough that the non-conductive probe may be passed into the ceiling cavity. In the event that the drywall fits very tightly against the electrical box, duct boot, etc, then lightly trace the cover with a pencil to determine whether or not the opening could be enlarged sufficiently to allow the probe to pass into the ceiling cavity while still being hidden by the fixture or register cover when it is replaced.

Pass the probe into the ceiling cavity, taking care to avoid contact with any electrical wires or contacts, and then attempt to snag any insulating material that may be located within the ceiling cavity. Carefully remove the probe in order to confirm the presence and type of any insulating material caught on the barb. Insulating materials most commonly found in vaulted ceiling cavities in Boulder include fiberglass batts, rockwool batts, or blown cellulose.

C. Determine if there is continuous exterior rigid insulation present. In some cases, exterior rigid insulation board may be installed on top of the roof sheathing and below the roofing material. Typically, the fascia boards and flashings will conceal this insulation on sloped roofs. On flat roofs, tapered rigid insulation is typically installed on top of the roof sheathing and beneath a rubberized roofing membrane in order to direct rainwater toward drains or scuppers. In instances where the ceiling R-Value is calculated using the procedures below, flat-roofed structures with un-vented ceiling cavities that feature exterior tapered rigid insulation may be credited as having R-4 continuous insulation in addition to any other insulation values present in the ceiling assembly.

Determine the appropriate R-Value. Based on the assessment, determine the appropriate R-Value from the Checklist. The categories are defined as follows:

No Insulation: Vaulted ceiling cavities are uninsulated and no continuous exterior insulation is present.

R-19: Vaulted ceiling cavities are 7-1/4" deep or less and the cavities are filled with any type of fibrous insulation.

R-30: Vaulted ceiling cavities are 9-1/4" to 10" deep and the cavities are filled with any type of fibrous insulation.

>R-38: Attic vaulted ceiling cavities are 11-1/4" deep or greater and the cavities are completely filled with any type of fibrous insulation.

Other Ceiling Types: In the event that a vaulted ceiling assembly is encountered that does not appear to align with any of the prescribed values given by the checklist, the assembly's U-Value may be calculated and points may be assigned using Table 3.5—Ceiling Points U-Value Alternate. The vaulted ceiling assembly U-Value shall be calculated using the process outlined in Appendix C.

Step 5

Assign Appropriate Percentages

Where multiple ceiling types are present within the Unit, their thermal performance characteristics must be assigned according to their representative portion of the total ceiling area. In order to maintain the simplicity of the Checklist, this value is divided into 25% increments. In the event that a given Unit has more than four ceiling types, the four most dominant types, by area, must first be identified. Then, rounding the nearest categorical value, the ceiling types must be assigned a presence of either 0%, 25%, 50%, 75%, or 100%. The sum of the percentages indicated on the Checklist must equal 100%.

Step 6

Determine the Appropriate Number of Points

Assign the appropriate number of points for this section according to the procedure detailed in the introduction to the Technical User's Guide. For attics or vaulted ceilings where the U-Value was calculated according to the procedures detailed in Appendix C, points shall be assigned according to Table 3.5

Table 3.5–Ceiling Points U-Value Alternate

CEILING Base:_____ Final:_____

U-VALUE	25%	50%	75%	100%
≥ 0.089	0	0	0	0
0.088 – 0.046	6	12	18	24
0.045 – 0.032	6	13	19	26
0.031 – 0.025	7	13	20	26
≤ 0.024	7	14	20	27

Section 4: Infiltration

Step 1

Calculate the Volume of Conditioned Space

The Inspector must calculate the volume (in cubic feet) of the Unit's conditioned space. For the purposes of this analysis, the conditioned volume includes all space within the Unit's primary air barrier, including the volume of any interior floor structures[1]. Typically, this calculation can be done by following these steps:

A. Calculate the total conditioned floor area by measuring the floor area that falls within the Unit's primary air barrier. For Units with multiple levels with varying areas or ceiling heights, it is advisable to measure and record the conditioned floor area of each level.

B. For each level, multiply the conditioned floor area by the average distance from the top face of the floor to the top face of the floor above. In other words, the volume of any floor structures separating two levels should be included in the total conditioned volume calculation.

C. For one-story Units or for the top level of multi-story Units, calculate the conditioned volume by multiplying the conditioned floor area by the average distance from the top face of the floor to the inside face of the ceiling finish material; this is typically the primary air barrier of the ceiling assembly.

D. Where complex geometries exist, such as cathedral ceilings, it may be easiest to break out these areas and calculate their volumes individually.

E. Sum all of the volumes that were calculated for each level and/or complex geometric shape.

1. Uninhabitable conditioned spaces such as conditioned crawl spaces or conditioned attics must have their volumes included in this calculation. Similarly, unconditioned basements where the thermal boundary is located at the floor separating the main living space and the basement should not have their volumes included in this calculation. Bear in mind that taking measures such as insulating and conditioning a crawl space in order to comply with the requirements of SmartRegs will result in different volumes used in the base case and final case infiltration testing.

Quick Notes Infiltration

Conditioned Space: All space within the Unit's primary air barrier must be calculated

Geometries: It may be easier to individually calculate the volume of geometric elements, such as cathedral ceilings.

Get ready to do some math.

Step 2

Conduct Blower Door Depressurization Test

The Inspector shall perform a blower door depressurization test using the protocol described in Section 8 of ASTM Standard E779-10, with modifications per Appendix A of the Mortgage Industry National HERS Standards 2006. The procedure is detailed on the following page. The following protocol shall be followed in preparing the Unit for testing:

A. Set any atmospherically-vented water heaters within the Unit to the "Pilot" setting or otherwise ensure that the water heaters do not activate during the test procedure. Set any furnace power switches to the "Off" position.

B. Configure the Unit per Appendix A of the Mortgage Industry National HERS Standards 2006, as Appendix E.

C. Insert the blower door assembly through a penetration in the Unit's envelope. This is typically achieved through a door to the outside, though it may be through a window or other opening where a door to outside is not available (such as in some multifamily buildings where Unit doors access conditioned common hallways). Where a sufficiently large opening is not available, and/or the Unit is suspected to be substantially "tight," or the Unit has a very small interior volume, it may be necessary to use a duct blaster apparatus in lieu of a blower door. Once the apparatus is installed, configure the device to perform a fan depressurization test per the manufacturer's instructions.

D. Leave blower door cover installed until a baseline indoor/outdoor pressure difference (ΔP) is recorded.

E. Install a length of tubing such that it passes through the building envelope, connecting the interior and exterior space. Position the exterior end of the tubing such that it is sheltered from wind (including that induced by the blower door apparatus) and is free of obstructions such as dirt, snow or water. In general, the exterior end of the tube should remain on the same side of the Unit and in the general vicinity of the blower door apparatus. Attach the interior end of the tubing to the Reference Tap on Channel A of the manometer.

F. Install a second length of tubing connecting the blower door fan pressure tap to the Input Tap on Channel B of the manometer.

G. Configure the manometer to conduct a fan depressurization test per the manufacturer's instructions.

H. Measure the baseline ΔP with the fan opening covered and the fan off.

I. Calibrate the manometer to establish the baseline ΔP as the test zero point.

J. Following blower door manufacturer's instructions, perform a single-point depressurization test at a calibrated ΔP of 50 Pascals, then record the fan flow rate ("CFM50"). If the flow rate is varying dramatically due to wind or other mitigating factors, it may be necessary to take an average flow rate over a period of time. Further, a multipoint depressurization test, though not required, is highly advised, especially when that test is computer-assisted. The results of these tests tend to be more accurate and provide a greater depth of information about the nature of air infiltration in the Unit.

K. Return water heaters to previous temperature setting and return furnace switch to the "On" position.

Step 3

Calculate the ACHn

Calculate the Unit's Infiltration Rate in Air Changes per Hour at 50 Pascals ΔP WRT Outdoors (ACH_{50}). Once the Unit's CFM_{50} value has been determined, calculate the Unit's ACH_{50} value by applying the equation below:

$$ACH_{50} = \frac{CFM_{50} * 60}{\text{UNIT VOLUME}}$$

Calculate the Unit's Infiltration Rate in Natural Air Changes per Hour (ACHn). The Inspector must apply the following procedure in order to determine the Unit's ACHn. Determine the appropriate value for "n" from Table 4.1.

		# of Stories Above Grade			
Wind Exposure	1	1.5	2	2.5	3
Well-shielded	22.2	20.0	17.8	16.6	15.5
Normal	18.5	16.7	14.8	13.9	13.0
Exposed	16.7	15.0	13.3	12.5	11.7

Calculate the Unit's ACHn by applying this equation:

$$ACHn = \frac{ACH_{50}}{n}$$

Step 4

Determine the Number of Points

The ACHn value should be rounded to the nearest categorical value. Rounding shall be performed as shown on the next page.

7 POINTS: Units with an ACHn of 1.21 or more

2 POINTS: ACHn of 1.20 to 0.98

4 POINTS: ACHn of 0.97 to 0.63

6 POINTS: ACHn of 0.62 to 0.36

7 POINTS: ACHn of 0.35 or less
Must be ventilated per ASHRAE Standard 62.2

Section 5: Slab / Foundation

Step 1

Locate the Thermal Boundary

The bottom portion of the thermal boundary can be located in a variety of places depending on the nature of Unit's foundation and the location of any insulating material. In general, the thermal boundary is located at the building component across which the greatest temperature differentials occur during the heating season. For any portion of a Unit that lies over a crawl space containing space heating equipment or distribution systems (whether insulated or not), the Inspector should consider the thermal boundary to be located at the foundation walls.

Quick Notes
Foundation

Thermal Boundary: Generally, a foundation's thermal boundary is located at the building component across which the greatest temperature differentials occur during the heating season.

Step 2

Determine the Applicable Category

Once the thermal boundary has been defined, determine which of the Checklist categories best describe the identified thermal boundary location(s). The categories are as follows:

Slab-on-Grade: This category applies to any portion of a Unit's floor that consists of a concrete slab resting atop ambient soil where the top face of the slab is 12 inches or less below grade.

Below-Grade Slab (Basement Slab): This category applies to any portion of a Unit's floor that consists of a concrete slab resting atop ambient soil where the top face of the slab is more than 12" below grade.

Foundation Walls (Crawl Space): This category applies to Units located atop a directly or indirectly conditioned crawl space. For the purposes of the Checklist, any crawl space that contains space heating equipment and/or heating ductwork (whether insulated or not) is considered to be an indirectly-conditioned crawl space, regardless of the presence of crawl space vents.

Framed Floor: This category applies to any portion of a Unit's floor that is located atop a vented crawl space that is not conditioned and that contains no heating equipment, and/or heating ductwork.

Step 3

Determine the Predominant R-Value(s)

Slab-on-Grade: The Checklist provides two potential insulation locations for slab-on-grade floors; slab-edge insulation and under-slab insulation.

Slab-Edge Insulation: This refers to any continuous insulation material that lies between the slab's perimeter and the ambient air or soil adjacent to the slab. This insulation may be located on the exterior face of the foundation wall or between the inside face of the foundation wall and the outer perimeter of the slab. In either case, in order to be credited as slab-edge insulation, the insulation must start at the top face of the slab and descend at least 12" below grade. In order to minimize the penalty for existing slab-on-grade structures that lack slab-edge insulation, points have been awarded on the Checklist for R-0 or no insulation. R-Values for slab-on-grade floors that are insulated in accordance with the criteria above shall be calculated per the equation below using the $R_{Material}$ values from Table 1.2.

$$R_{Total} = (R_{Material} * DEPTH_{Material})$$

$R_{Material}$ = R-Value per inch of the continuous insulation material located at the slabedge or under-slab

Determine the most appropriate category. The Checklist categories are defined as follows:

Slab-Edge: >R-5: Slab-on-grade floors with slab-edge insulation meeting the criteria above and having an insulating value between R-5 and R-9. Note that any material with an insulating value of less than R-5 does not meet these requirements. As such, the commonly present ½" – ¾" thick fibrous material meant to allow for slab expansion/contraction does not have an insulating value that meets the requirements of this category.

Slab-Edge: >R-10: Slab-on-grade floors with slab-edge insulation meeting the criteria above and having an insulating value of R-10 or greater.

Under-Slab Insulation: Under-slab insulation refers to any continuous insulation material that lies between the bottom face of the slab and the ambient soil below the slab. As this

insulation is not typically visible to the Inspector, its presence can only be established by the Unit owner. The Inspector should use their reasonable judgment in determining whether or not to credit the Unit as having under-slab insulation. In general, this type of insulation was only installed in projects built since the late 1970s, in particular those projects designed based on passive solar design principles. Points for under-slab insulation are only available for those slab-on-grade floors that also have slab-edge insulation.

Slab-Edge: >R-10 AND Under-Slab: >R-10: Slab-on-grade floor assemblies that have BOTH slab-edge insulation meeting the criteria above with an insulating value of R-10 or greater AND under-slab insulation meeting the criteria above with an insulating value of R-10 or greater.

Below-Grade Slab (Basement Slab): Because soil that is greater than 12" below grade typically maintains temperatures that are higher than the ambient air temperature during the heating season, winter heat loss across these slabs is not as significant slabs-on-grade. For this reason, all below-grade slabs are awarded points on the Checklist.

Foundation Walls (Crawl Space): As indicated in Step 1, for any portion of a Unit that lies over a crawl space containing space heating equipment or distribution systems (whether insulated or not), the Inspector should consider the thermal boundary to be located at the foundation walls. This is because a significant amount of heat is being lost to this area from the furnace/boiler cabinet, pipes serving a hydronic space heating system, and/or heating ductwork. Framed floor insulation is not credited in these situations because insulating in this location serves only to further ensure that this unintentionally lost energy is unable to reach the Unit's habitable space. When analyzing crawl space walls, insulation located on the interior or exterior face of the foundation walls qualifies. R-Values for foundation walls shall be calculated per the equation below using the $R_{Material}$ values from Table 1.2.

$$R_{Total} = (R_{Material} * DEPTH_{Material})$$

$R_{Material}$ = R-Value per inch of the continuous insulation material located at the slabedge or under-slab.

Inspectors must note that points are not to be awarded for crawl spaces which are fitted with foundation wall insulation but which lack a properly lapped and sealed vapor retarder and adequate ventilation. In order to earn points for crawl space wall insulation, crawl spaces must meet the requirements of Section R408.3 of the 2006 International Residential Code (IRC). The requirements for "Unvented crawl space" are as follows:"

1. Exposed earth is covered with a continuous vapor retarder. Joints of the vapor retarder shall overlap by 6 inches (152 mm) and shall be sealed or taped. The edges of the vapor retarder shall extend at least 6 inches (152 mm) up the stem wall and shall be attached and sealed to the stem wall; and
2. One of the following is provided for the under-floor space:
    - 2.1. Continuously operated mechanical exhaust ventilation at a rate equal to 1 cfm (0.47 L/s) for each 50 ft2 (4.7m2) of crawlspace floor area, including an air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.8;
    - 2.2. Conditioned air supply sized to deliver at a rate equal to 1 cfm (0.47 L/s) for each 50 ft2 (4.7 m2) of under-floor area, including a return air pathway to the common area (such as a duct or transfer grille), and perimeter walls insulated in accordance with Section N1102.2.8;
    - 2.3. Plenum complying with Section M1601.4, if under-floor space is used as a plenum.

Determine the most appropriate category. The checklist categories are defined as follows:

R-0: Foundation wall assemblies that include no insulation on the interior or exterior.
R-2: Foundation wall assemblies that include interior and/or exterior insulation with an insulating value within the range of R-2 to R-6.
R-11: Foundation wall assemblies that include interior and/or exterior insulation with an insulating value within the range of R-7 to R-18.
>R-19: Foundation wall assemblies that include interior and/or exterior insulation with an insulating value of R-19 or greater.

Framed Floor: Those portions of a Unit's framed floor that lie over an unconditioned space (including unconditioned crawl space or basement volumes provided that those volumes contain no space heating equipment or distribution systems) should be assigned points under this category. The Checklist provides the following framed floor insulation categories:

Framed Floor: R-0: Framed floors assemblies, over unconditioned space, that include no cavity insulation.

Framed Floor: R-13: Framed floors assemblies, over unconditioned space, that include cavity insulation with an insulating value within a range of R-7 to R-19.

Framed Floor: R-25: Framed floors assemblies, over unconditioned space, that include cavity insulation with an insulating value within a R-20 to R-37 range.

Framed Floor: >R-38: Framed floors assemblies, over unconditioned space, that include cavity insulation with an insulating value of R-38 or greater.

Shared Floor: Framed floor assemblies that lie between the Unit and another conditioned space such as another dwelling unit, conditioned common space, or commercial space.

Other Floor Assemblies: In the event that a framed floor assembly is encountered that does not appear to align with any of the prescribed values given by the checklist or where the framed floor assembly includes continuous insulation, the assembly's U-Value may be calculated and points may be assigned using Table 5.3d - Framed Floor Points U-Value Alternate. The framed floor assembly U-Value shall be calculated using the process outlined in Appendix D.

Step 4

Assign Appropriate Percentages

The total percentage for all categories in the Slab/Foundation section of the Checklist must equal 100%. Foundation Wall category shall be assigned its percentage of the total floor area according to the area of the framed floor above the crawl space, not the area of the foundation walls. Where appropriate, this percentage may be further sub-divided to accommodate multiple foundation wall types.

Step 5

Determine the Appropriate Number of Point

Assign the appropriate number of points according to the procedure detailed in the intro to the Technical User's Guide.

Section 6: Duct Leakage

Step 1

Determine the Unit's Rate of Duct Leakage to Outside at 25 Pascals $\triangle P$ ("CFM25")

The Inspector shall perform a duct leakage to outside test using the protocol described in Annex B of ASHRAE Standard 152-2004, with modifications per Appendix A of the Mortgage Industry National HERS Standards 2006, including RESNET Formal Interpretation 2006-002. The procedure is detailed in Appendix F.

For Units where all ducts are located within the conditioned envelope (i.e., on the inside of the thermal boundary and primary air barrier), AND where the Unit has achieved a tested air infiltration rate below 3.0 ACH50, the maximum number of points available may be awarded WITHOUT performing a duct leakage to outside test.

Step 2

Calculate the Unit's Area-Normalized Rate of Duct Leakage to Outside ("CFM25 per 100 square feet")

Determine the Unit's area-normalized rate of duct leakage to outside by performing this calculation:

$$\text{CFM}_{\text{per 100 SF}} = \frac{\text{CFM}_{25}}{\text{A}_{\text{Unit}} / 100}$$

CFM25 = Rate of duct leakage to outside in cubic feet per minute at 25 Pascals, AUnit = Area of Unit is square feet

Step 3

Determine the Appropriate Number of Points

In order to determine the appropriate number of points to be assigned on the Checklist, the CFM per 100 SF value should be rounded to the nearest categorical value. Rounding shall be performed as follows:

Units with a duct leakage to outside rate of ...

0 points: 70 CFM per 100 SF or greater

4 points: 50 to 69 CFM per 100 SF

9 points: 30 to 49 CFM per 100 SF

14 points: 11 to 29 CFM per 100 SF

17 points: 10 CFM per 100 SF or less and Units that have no ducts

Section 7: Distribution System

To determine the appropriate number of points to award in this section, the Inspector must identify the space heating delivery systems present within the Unit. Typically, these will be either a network of ducts in the case of a forced-air heating system or a network of pipes in the case of a "radiant" system (hot water baseboard, steam radiator, radiant floor, etc.). Units primarily heated by electric resistance baseboards are automatically awarded the maximum number of points in this category. For this section there are two critical pieces of information that must be ascertained about the components of the delivery system—location and insulation.

Location: In this section, location refers to whether the ducts or pipes are located inside or outside of the Unit's thermal boundary (i.e., in conditioned or unconditioned space). The Inspector must judge the percentage of the delivery system that falls into both categories.

Insulation: The Inspector must then determine what percentage of the ducts or pipes that are located in unconditioned space (outside of the thermal boundary) are wrapped in insulation (R-4 minimum).

Once these two items have been established, the Inspector shall assign the appropriate number of points for this section according to the procedure detailed in the introduction to the Technical User's Guide.

Section 8: Heating

In order to assign points in this section of the Checklist, the Inspector must determine the primary heating system's fuel type and efficiency. Where the Annual Fuel Utilization Efficiency ("AFUE") is not available for a natural gas furnace, refer to Table 8.1 or consult the AHRI Directory to determine the appropriate category. The Coefficient of Performance ("COP") for a ground source heat pump must be determined using the values listed in the Air-Conditioning, Heating, and Refrigeration Institute ("AHRI", formerly "ARI") Directory of AHRI Certified Water-to-Air and Brine-to-Air Heat Pumps. If unable to determine the Annual Fuel Utilization Efficiency for mechanical equipment using the AHRI Directory, consult Table 8.1 and/or Table 8.2 in order to assign "Default Values for Mechanical System Efficiency" based on the equipment's characteristics or vintage. Points for this section shall be awarded as follows:

0 POINTS: Electric baseboard heating systems, electric furnaces and boilers, air source heat pumps, fuel oil furnaces and boilers, natural gas furnaces with an AFUE of 74% or less

13 POINTS: Natural gas furnaces with an AFUE of 75% to 84%

17 POINTS: Natural gas furnaces with an AFUE of 85% to 93%

19 POINTS: Natural gas furnaces with an AFUE of 94% or greater

29 POINTS: Ground source heat pumps with a COP of 3.3 to 3.7

38 POINTS: Ground source heat pumps with a COP of 3.8 to 4.4

43 POINTS: Ground source heat pumps with a COP of 4.5 or greater

Table 8.1 – Natural Gas Furnace / Boiler Default Efficiencies (Characteristic-based)

Efficiency (AFUE)	Typical Characteristics
<70%	metal flue pipe, draft hood or draft diverter, no inducer motor, ribbon burner, standing pilot
~80%	metal flue pipe, inducer motor tied to flue, no draft hood or diverter, no ribbon burner, advanced heat exchanger, electronic ignition
>90%	PVC flue pipe (typically flue pipe AND combustion air intake both present), secondary condensing heat exchanger
>96%	same as above – increased efficiency can only be verified by the ENERGY GUIDE sticker (if present), consulting the AHRI Directory, or consulting the manufacturer's data

Section 9: Cooling

In order to assign points in this section of the Checklist, the Inspector must first determine whether or not there is a cooling system present in the Unit. If any of the cooling systems identified below are present, the primary cooling system type and efficiency must be determined. Where the Seasonal Energy Efficiency Ratio (SEER) is not available for a Direct Expansion (DX) air conditioning unit or air-source heat pump, refer to Table 9.1 or consult the AHRI Directory to determine the appropriate category. The Energy Efficiency Ratio (EER) for a ground source heat pump must be determined using the values listed in the Air-Conditioning, Heating, and Refrigeration Institute (AHRI, formerly ARI) Directory of AHRI Certified Water-to-Air and Brine-to-Air Heat Pumps. If unable to locate the equipment in the AHRI Directory, consult the manufac-

Table 8.2 Default Values for Mechanical System Efficiency (Age-based)

Mechanical Systems	Units	Pre-1960	1960-1969	1970-1974	1975-1983	1984-1987	1988-1991	1992 to present
Heating:								
Gas Furnace	AFUE	0.60	0.60	0.65	0.68	0.68	0.76	0.78
Gas Boiler	AFUE	0.60	0.60	0.65	0.65	0.70	0.77	0.80
Oil Furnace or Boiler	AFUE	0.60	0.65	0.72	0.75	0.80	0.80	0.80
Air-Source Heat Pump	HSPF	4.50	4.50	4.70	5.50	6.30	6.80	6.80
Ground-Water Geothermal Heat pump	COP	2.70	2.70	2.70	3.00	3.10	3.20	3.50
Ground-Coupled Geothermal Heat Pump	COP	2.30	2.30	2.30	2.50	2.60	2.70	3.00

turer's specifications to find the appropriate EER under AHRI specified operating conditions. Points for this section shall be awarded as follows:

0 POINTS: DX air conditioners w/SEER of 12 or less

4 POINTS: DX air conditioners w/SEER of 13 and Ground source heat pumps with an EER of 13.6 or greater

6 POINTS: DX air conditioners w/SEER of 14 to 15, direct evaporative coolers, units with no A/C systems

7 POINTS: DX air conditioners w/SEER of 16 to 17

8 POINTS: DX air conditioners w/SEER of 18 or greater and indirect evaporative coolers

Table 9.1 - Air Conditioner Default Efficiencies

Type	Vintage	Efficiency (SEER)
Window Unit	1970's and earlier	6.5
Window Unit	1980's	7.5
Window Unit	1990's	8.5
Window Unit	2000's	10
Central A/C	1970's and earlier	6.5
Central A/C	1980's	8
Central A/C	Federal Minimum Standard from 1992 to 2005	10
Central A/C	Federal Minimum Standard from 2006 to Present	13
Central A/C – ENERGY STAR Qualified	2009 and later	14.5

Section 10: Whole House Fans

Units that feature an operating whole-house fan should be awarded 2 points in this section of the Checklist. The Inspector must turn on the whole-house fan to ensure that it is in working condition.

Section 11: Lighting

Step 1

Determine % of High-Efficacy Light Bulbs

1 . Record the number of incandescent and CFL or LED lamps in the Unit. Consider lamps in permanent fixtures only; temporary lamps (e.g. floor lamps and table lamps) are not to be counted for this point.

2.Calculate the percentage of high-efficacy lighting by applying the following equation.

$$HEL = 100 \left(\frac{Lamps_{HE}}{Lamps_{Total}} \right)$$

HEL = % of Unit's lighting that is high-efficacy (pin-based fluorescent,CFL,LED, tubular skylights)

$Lamps_{HE}$ = Total number of lamps that qualify as high-efficacy

$Lamps_{Total}$ = Total number of lamps

Tubular Skylights: Count as one high efficiency light bulb in this equation

Step 2

Determine the Appropriate Number of Points

In order to determine the appropriate number of points to be assigned on the Checklist, the HEL percentage should be rounded to the nearest categorical value. Rounding shall be performed as follows:

0 POINTS: Units with HEL of 12% or less

2 POINTS: Units with HEL of 13% to 37%

4 POINTS: Units with HEL of 38% to 62%

6 POINTS: Units with HEL of 63% to 87%

7 POINTS: Units with HEL of 88% or greater

Section 12: Water Heating

In order to assign points in this section of the Checklist, the Inspector must determine the primary domestic water heating (DWH) system's fuel type and efficiency. Where the Energy Factor (EF) is not available for a water heater, refer to Table 12.1 or consult the AHRI Directory to determine the appropriate category. Points for this section shall be awarded as follows:

0 POINTS: Electric DWH systems, fuel oil DWH systems, heat pump DWH systems, and storage-type, natural gas DWH systems with an EF of 0.58 or less

1 POINT: Storage-type, natural gas DWH systems with an EF of 0.59 to 0.61

2 POINTS: Storage-type, natural gas DWH systems with an EF of 0.62 to 0.81

6 POINTS: Storage-type, natural gas DWH systems with an EF of 0.82 or greater and on-demand, natural gas DWH systems

0 POINTS: Indirect-fired DWH tanks linked to natural gas boilers with an AFUE of 70% or less

3 POINTS: Indirect-fired DWH tanks linked to natural gas boilers with an AFUE of 78% to 82%

5 POINTS: Indirect-fired DWH tanks linked to natural gas boilers with an AFUE of 90% or greater

Table 12.1 - Water Heater Default Efficiencies

Type	Vintage	Efficiency (EF)
Storage, typical	1980's and earlier	0.58
Storage, typical	1990's and 2000's	0.59
Storage, ENERGY STAR	2000's	0.62
Storage, ENERGY STAR	2011 and later	0.67

Section 13: Refrigeration

Locate Refrigerators, Freezers, Ice Makers

The Inspector must identify all refrigeration equipment in the Unit. This includes, but is not limited to, refrigerators, freezers, ice makers, beverage centers, and wine chillers. Refrigeration equipment located in garages, basements and other unconditioned or semi-conditioned spaces should be included in the inspection.

Determine the Annual Energy Consumption of the Equipment ("kWh/yr")

The annual energy consumption of the refrigeration equipment may be determined in several ways. The ENERGY GUIDE data for newer equipment can often be found by consulting the manufacturer's Website or by searching one of the following websites: www.appliances.energy.ca.gov and/or www.energystar.gov.

When the rated annual energy consumption of the equipment is unavailable, an estimate may be made by plugging the piece of equipment into an electricity usage monitoring device for as long as feasible (preferably over an hour). The device should provide an estimate of equipment's energy consumption in kilowatt hours per year ("kWh/yr").

In instances where the ENERGY GUIDE data is not available and where monitoring the equipment's energy consumption is not feasible, determine the appropriate value using one of the following two options:

A. Use the ENERGY STAR Refrigerator Retirement Savings Calculator, (www.energystar.gov/index.cfm?fuseaction=refrig.calculator) to estimate the energy consumption based on the unit type, age, and volume.

B. Determine the appropriate value from Table 13.1.

Table 13.1 - Refrigerator Consumption Defaults

Manufactured prior to 2000	750 kWh/yr
Manufactured in 2000 or later	650 kWh/yr
ENERGY STAR Manufactured prior to 2000	650 kWh/yr
ENERGY STAR manufactured in 2000 or later	450 kWh/yr

Once a reasonable kWh/yr value has been established for each piece of refrigeration equipment associated with the Unit, the values should be added together to determine the total kWh/yr.

Determine the Appropriate Number of Points

In order to determine the appropriate number of points to be assigned on the Checklist, the total kWh/yr should be rounded to the nearest categorical value. Rounding shall be performed as follows:

0 POINTS: Units with a total kWh/yr of 701

2 POINTS: Units with a total kWh/yr of 501 to 700

3 POINTS: Units with a total kWh/yr of 351 to 500

4 POINTS: Units with a total kWh/yr of 350 or less

Section 14: Solar Thermal

Units featuring operational solar thermal systems for space and/or domestic water heating shall be awarded points according to the amount of collector surface area. The method for calculating the appropriate number of points is provided below. Points for flat-plate collectors should be determined as follows:

$$\text{Checklist Points} = 8\left(\frac{(\mathbf{W}\text{Plate} * \mathbf{L}\text{Plate}) * (\#\text{ of Plates})}{20}\right)$$

WPlate = width of one flat-plate collector
LPlate = length of one flat-plate collector

Points for evacuated tube collectors should be determined by:

$$\text{Checklist Points} = 8\left(\frac{(\mathbf{D}\text{Tube} * \mathbf{L}\text{Tube}) * (\#\text{ of Tubes})}{15}\right)$$

DTube = diameter of one evacuated tube
LTube = length of one evacuated tube

Section 15: Photovoltaics

NOTE: A unit must earn 70 prescriptive pathway points in other categories to be eligible for points in this category. Units featuring solar photovoltaic (PV) systems for on-site electricity generation shall be awarded points according to the rated output of the array, in kW. Points should be calculated according the following equation:

$$\text{Checklist Points} = 44\left(\frac{(\mathbf{O}\text{Panel}) * (\#\text{ of Panels})}{1000}\right)$$

OPanel = the rate output of one panel

Section 16: Occupant Behavior

The Inspector shall award points in the Occupant Behavior section of the Checklist as follows:

1 POINT: **Real Time Energy Monitoring Device:** Any device that provides instant feedback on the Unit's rate of electricity consumption

Programmable thermostat; provide operation / training manual: A manual which describes how to efficiently operate the systems in the house that regulate energy efficiency [e.g. heating/cooling, lighting controls, windows] systems in the property must be on-site and accessible to tenants

Tenant attends Energy Conservation Class: A certificate verifying that the tenant attended an energy conservation class must be provided to the inspector. For class info see: **www.bouldercolorado.gov/smartregs**

Section 17: Other

The Inspector shall award points in the "Other" section of the Checklist as follows:

1 POINT: **Heat Pump Desuperheater;** Only Unit's that are heated and cooled via a ground source heat pump are eligible to earn this point. A "Heat Pump Desuperheater" is a secondary heat exchanger that captures "waste" heat from a heat pump and uses it for domestic water heating.

3 POINTS: **Electronically Commutated Motor (ECM);** In order to earn this point, the blower motor of the Unit's primary air handler must be an electrically-efficient ECM motor. Electrically efficient furnaces are denoted with an "e" on the AHRI Certificate.

DISCRETIONARY: **Passive Solar Design;** In order to earn points in this category, a Unit owner must prove to the City of Boulder that the Unit is properly oriented and designed such that it meets a significant portion of its annual heating demands with passive solar gain. Once approved, the City of Boulder will determine the appropriate number of points to be awarded.

DISCRETIONARY: **Innovative Practice;** In order to earn points in this category, a Unit owner must prove to the City of Boulder that the Unit significantly reducing carbon dioxide emissions utilizing a means that is not directly addressed by any other section of the Checklist. Once approved, the City of Boulder will determine the appropriate number of points to be awarded.

Section 18: Mandatory Water Conservation

Two points in this section are required in addition to the 100 point Checklist. The Inspector shall award points in the Mandatory Water Conservation section as follows:

Low Flow Showerhead: In this category, 1 point is awarded when the average flow rate of all of the showerheads within the unit are 2.0 GPM or less. The average flow rate for all showerheads must be less than or equal to 2.0 gallons per minute (gpm). If the flow rate is not labeled on the showerhead, the inspector can do the following:

1. Turn the fixture on to its normal position
Place a container under the fixture and collect the water for 10 seconds.

2. Measure the quantity of water in the container and convert the measurement to gallons (e.g., 0.25 gallons).

3. Multiply the measured quantity of water by 6 to calculate the flow rate in gallons per minute (0.33 gal x 6 = 2.0 GPM).

Low Flow Lavatory Faucets: In this category, 1 point is awarded when the average of all the lavatory faucets within the unit are 1.5 GPM or less. The average flow rate for all lavatory faucets must be less than or equal to 1.5 gallons per minute (gpm). To measure the flow rate:

1. Turn the fixture on to its normal position.

2. Place a container under the fixture and collect the water for 10 seconds.

3. Measure the quantity of water in the container and convert the measurement to gallons (e.g., 0.25 gallons).

4. Multiply the measured quantity of water by 6 to calculate the flow rate in gallons per minute (0.25 gal x 6 = 2.0 GPM).

Self Closing Faucet Valves: In this category, 1 point is awarded when all faucets are installed with a self closing valve which automatically turns the water off after a certain period of time.

High-Efficiency or Dual-Flush Toilet: In this category, 2 points are awarded when the average rate of gallons per flush (gpf) for all of the toilets, including dual-flush toilets, in the unit are 1.28 gpf or less. When determining the flush rate for dual-flush toilets, use the following equation:

ENERGY STAR Washing Machine: In this category, 2 points are awarded for an ENERGY STAR washing machine. ENERGY STAR labels must stay on the equipment for inspection by a HERS rater or Class G inspector during inspection.

ENERGY STAR Dishwasher: In this category, 2 points are awarded for an ENERGY STAR dish washer. ENERGY STAR labels must remain on the equipment for inspection by a HERS rater or Class G inspector during final inspection.

Appendix A: Wall Assembly U-Value

Determine the assembly's Framing Factor ("FF"). FF is an approximation of the percentage of wall surface area that is represented by the framing members versus the wall surface area that is represented by cavity space. Select the appropriate FF from Table 1.1a.

Table 1.1a - Wall Framing Factor Defaults

Stud Spacing	Number of Plates	Plate Height	FF
16" on-center framing (typical)	3	8'	0.23
24" on-center framing	3	8'	0.20
16" on-center framing (typical)	3	10'	0.22
24" on-center framing	3	10'	0.19

Determine the total cavity insulation R-Value (R_{Cavity}). Using the $R_{Material}$ values (from Table 1.2) for the cavity insulation material(s) present, calculate the total cavity R-Value using the equation below[1].

$$R_{Cavity} = (R_{Material1} * Depth_{Material1}) + (R_{Material2} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the wall assembly
RMaterial2 = R-Value per inch of a second cavity insulation material if present in the wall assembly

Determine the total continuous insulation R-Value (RContinuous). Using the RMaterial values (from Table 1.2) for the continuous insulation material(s) present, calculate the total continuous R-Value using the equation below.

$$R_{Continuous} = (R_{Material1} * Depth_{Material1}) + (R_{Material1} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the wall assembly
RMaterial2 = R-Value per inch of a second cavity insulation material if present in the wall assembly

Determine the framing area R-Value ($R_{Framing}$). Select the appropriate $R_{Framing}$ value from Table 1.2a.

Table 1.2a - Wall Stud R-Value

Nominal Dimensions	Actual Depth	$R_{Framing}$
2x4	3.5"	4.38
2x6	5.5"	6.88
2x8	7.25"	9.06

Calculate the assembly's U-Value. Perform the calculation below to determine the U-Value of the wall assembly.

$$\text{U-Value} = \frac{1 - FF}{2.24 + R_{Cavity} + R_{Continuous}} + \frac{FF}{2.24 + R_{Framing} + R_{Continuous}}$$

1 Uninsulated 2x4 cavities shall be assigned an RCavity of 1.03. Uninsulated 2x6 cavities shall be assigned an RCavity of 1.62.

Appendix B: Attic Ceiling Assembly U-Value

Determine the assembly's Framing Factor (FF). FF is an approximation of the percentage of ceiling surface area that is represented by the framing members versus the ceiling surface area that is represented by cavity space. Select the appropriate FF from Table 3.1b.

Table 3.1b - Attic Framing Factor Defaults

Framing Spacing	FF
16" on-center framing (typical)	0.14
24" on-center framing	0.11

Determine the total cavity insulation R-Value (R_{Cavity}). In the case of an attic assembly, all insulation that is located in the cavity between the framing members is considered to be cavity insulation. Using the RMaterial values (from Table 1.2) for the cavity insulation material(s) present, calculate the total cavity R-Value using this equation:

$$R_{Cavity} = (R_{Material1} * Depth_{Material1}) + (R_{Material2} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the attic ceiling assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the attic ceiling assembly

Determine the total continuous insulation R-Value ($R_{Continuous}$). In the case of an attic assembly, all insulation that runs uninterupted over the top of the framing members is considered to be continuous insulation. Using the RMaterial values (from Table 1.2) for the continuous insulation material(s) present, calculate the total continuous R-Value using this equation:

$$R_{Continuous} = (R_{Material1} * Depth_{Material1}) + (R_{Material2} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the attic ceiling assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the attic ceiling assembly

Determine the framing area R-Value ($R_{Framing}$). Select the appropriate $R_{Framing}$ value from Table 1.2a.

Table 3.2b - Attic Framing R-Value

Nominal Dimensions	Actual Depth	$R_{Framing}$
2x4	3.5"	4.38
2x6	5.5"	6.88
2x8	7.25"	9.06
2x10	9.25"	11.56
2x12	11.25"	14.06

Calculate the assembly's U-Value. Perform the calculation below to determine the U-Value of the wall assembly[1].

$$\text{U-Value} = \frac{1 - FF}{1.67 + R_{Cavity} + R_{Continuous}} + \frac{FF}{1.67 + R_{Framing} + R_{Continuous}}$$

1 The constant value, 1.67, in the equation represents the estimated R-Value of the interior gypsum board, as well as the interior and exterior air films.

Appendix C: Vaulted Ceiling Assembly U-Value

Determine the assembly's Framing Factor (FF). FF is an approximation of the percentage of ceiling surface area that is represented by the framing members versus the ceiling surface area that is represented by cavity space. Select the appropriate FF from Table 3.3c.

Table 3.3c - Vaulted Ceiling Framing Factor Defaults

Framing Spacing	FF
Dimensional Lumber	
16" on-center framing (typical)	0.14
24" on-center framing	0.11
Truss Joist	
16" on-center framing (typical)	0.08
24" on-center framing	0.07

Determine the total cavity insulation R-Value (R_{Cavity}). Using the RMaterial values (from Table 1.2) for the cavity insulation material(s) present, calculate the total cavity R-Value using this equation:

$$R_{Cavity} = (R_{Material1} * Depth_{Material1}) + (R_{Material2} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the ceiling assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the ceiling assembly

Determine the total continuous insulation R-Value ($R_{Continuous}$). Using the $R_{Material}$ values (from Table 1.2) for any continuous exterior insulation material(s) present, calculate the total continuous R-Value using this equation:

$$R_{Continuous} = (R_{Material1} * Depth_{Material1}) + (R_{Material1} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the ceiling assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the ceiling assembly

Determine the framing area R-Value ($R_{Framing}$). Select the appropriate $R_{Framing}$ value from Table 3.4c.

Table 3.4c - Vaulted Ceiling Framing R-Value

Nominal Dimensions	Actual Depth	$R_{Framing}$
2x4	3-1/2"	4.38
2x6	5-1/2"	6.88
2x8	7-1/2"	9.06
2x10	9-1/4"	11.56
2x12	11-1/4"	14.06
12" Truss Joist	11-7/8"	8.00

Calculate the assembly's U-Value. Perform the calculation below to determine the U-Value of the ceiling assembly[1]

$$\text{U-Value} = \frac{1 - FF}{1.67 + R_{Cavity} + R_{Continuous}} + \frac{FF}{1.67 + R_{Framing} + R_{Continuous}}$$

1 The constant value, 1.67, in the equation represents the estimated R-Value of the interior gypsum board, as well as the interior and exterior air films.

Appendix D: Framed Floor Assembly U-Value

Determine the assembly's Framing Factor ("FF"). FF is an approximation of the percentage of ceiling surface area that is represented by the framing members versus the ceiling surface area that is represented by cavity space. Select the appropriate FF from Table 5.1d.

Table 5.1d - Framed Floor Framing Factor Defaults

Framing Spacing	FF
Dimensional Lumber	
16" on-center framing (typical)	0.14
24" on-center framing	0.11
Truss Joist	
16" on-center framing (typical)	0.08
24" on-center framing	0.07

Determine the total cavity insulation R-Value ("R_{Cavity}"). Using the RMaterial values (from Table 1.2) for the cavity insulation material(s) present, calculate the total cavity R-Value using this equation:

$$R_{Cavity} = (R_{Material1} * Depth_{Material1}) + (R_{Material1} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the floor assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the floor assembly

Determine the total continuous insulation R-Value ("$R_{Continuous}$"). Using the $R_{Material}$ values (from Table 1.2) for any continuous exterior insulation material(s) present, calculate the total continuous R-Value using this equation:

$$R_{Continuous} = (R_{Material1} * Depth_{Material1}) + (R_{Material1} * Depth_{Material2}) + \ldots$$

RMaterial1 = R-Value per inch of the first cavity insulation material present in the floor assembly

RMaterial2 = R-Value per inch of a second cavity insulation material if present in the floor assembly

Determine the framing area R-Value ("$R_{Framing}$"). Select the appropriate $R_{Framing}$ value from Table 5.2d.

Table 5.2d - Floor Framing R-Value

Nominal Dimensions	Actual Depth	$R_{Framing}$
2x4	3-1/2"	4.38
2x6	5-1/2"	6.88
2x8	7-1/2"	9.06
2x10	9-1/4"	11.56
2x12	11-1/4"	14.06
12" Truss Joist	11-7/8"	8.00

Calculate the assembly's U-Value. Perform the calculation below to determine the U-Value of the assembly[1].

$$\text{U-Value} = \frac{1 - FF}{3.66 + R_{Cavity} + R_{Continuous}} + \frac{FF}{3.66 + R_{Framing} + R_{Continuous}}$$

1 The constant value, 1.67, in the equation represents the estimated R-Value of the interior gypsum board, as well as the interior and exterior air films.

Determine the appropriate number of points on the Checklist according to Table 5.3d.

Table 5.3d

U-VALUE	25%	50%	75%	100%
≥ 0.112	0	0	0	0
0.111 – 0.052	3	5	8	11
0.051 – 0.037	3	6	9	12
0.036 – 0.024	4	7	11	14
≤ 0.023	4	8	11	15

Appendix E: Infiltration Rate Testing Procedure

Adapted from the Mortgage Industry National HERS Standard 2006.

Leave all supply registers and return grills open and uncovered.

Leave all bathroom and kitchen fans open (i.e., in their normal operating condition). Only a permanently installed back draft damper in its normal condition may impede the flow of air.

Leave any combustion air ducts or louvers to the exterior open. If a homeowner or builder has sealed them off, open them for the test.

Leave any make-up air ducts with in-line dampers (e.g., for large kitchen exhaust fans or combustion air) as-is (unsealed). Only a permanently installed back draft damper or motorized damper in its normal condition may impede the flow of air.

Leave the dryer vent as-is, whether or not the dryer is in place during the test. Only a permanently installed back draft damper in its normal condition may impede the flow of air.

Leave open any outside air duct supplying fresh air for intermittent ventilation systems (including a central-fan-integrated distribution system).

Operable crawl-space vents, where present, are to be left in the open position.

Open all interior doors within the conditioned space, including doors to conditioned basements. Closet doors may be left closed unless the closet contains windows or access to the attic or crawl space.

Leave louvered openings of a whole-house fan as is.

Close all doors to the exterior or unconditioned spaces; if any door to the exterior or unconditioned space lacks weather-stripping at testing time, it can be temporarily taped off.[1]

Close and latch all windows.

Close chimney dampers.

Either seal or fill with water plumbing drains with p-traps that may be empty.

Seal off exterior duct openings to continuously operating fresh-air or exhaust-air ventilation systems (preferably at the exterior envelope).

Close any adjustable window trickle ventilators and/or adjustable through-the-wall vents.

If an evaporative cooler (*or whole-house fan*) has been supplied with a device used to seal openings to the exterior during the winter, that device should be installed for the test.

1 Doors that connect the Unit to conditioned common space within a multifamily building are to be left closed.

Appendix F: Duct Leakage Testing Procedure

The following protocol shall be followed in preparing the Unit for testing:

1. Open all of the Unit's interior doors that separate conditioned spaces from one another (e.g., bathroom doors, bedroom doors, etc.) to ensure equal pressures throughout the Unit.

Exception: Leave closed doors that connect the Unit to conditioned common space within a multifamily building.

2. Close all exterior doors that separate conditioned spaces from unconditioned spaces (e.g., front door, sliding glass doors, and doors to garage or unconditioned basement, etc.).

3. Adjust the HVAC system controls to ensure that the system does not turn on during the test.

4. Insert the blower door assembly through a penetration in the Unit's envelope. This is typically achieved through a door to outside, though it may be through a window or other opening where a door to outside is not available (such as in some multifamily buildings where Unit doors access conditioned common hallways). Where a sufficiently large opening is not available, and/or the Unit is suspected to be substantially "tight," or the Unit has a very small interior volume, it may be necessary to use a duct blaster apparatus in lieu of a blower door. Once the apparatus is installed, configure the device to perform a fan depressurization test per the manufacturer's instructions.

5. Install a length of tubing such that it passes through the building envelope, connecting the interior and exterior space. Position the exterior end of the tubing such that it is sheltered from wind (including that induced by the blower door apparatus) and is free of obstructions such as dirt, snow or water. In general, the exterior end of the tube should remain on the same side of the Unit and in the general vicinity of the blower door apparatus. Attach the interior end of the tubing to the Reference Tap on Channel A of the blower door manometer.

6. Install a second length of tubing connecting the blower door fan pressure tap to the Input Tap on Channel B of the blower door manometer.

7. Configure blower door manometer to conduct a fan pressurization test per the manufacturer's instructions.

8. Cover and seal all supply and return registers/grilles within the Unit.

9. Remove furnace air filter and replace filter cover.

10. Remove furnace cabinet cover to reveal blower and return plenum entry. Connect duct blaster apparatus directly to furnace cabinet or largest (preferably nearby) return air grille, being sure to follow manufacturer's instructions. The duct blaster should be installed such that no significant air leaks exist at the connection to the furnace cabinet or return air grille.

11. Install a length of tubing connecting the Input Tap on Channel A of the duct blaster manometer to a duct-pressure probe installed in the supply duct system via the nearest supply register.

12. Install a final length of tubing connecting the duct blaster fan pressure tap to the Input Tap on Channel B of the duct blaster manometer.

13. Configure the duct blaster manometer to conduct a duct pressurization test per the manufacturer's instructions.

14. Using the blower door, pressurize the Unit to 25 Pascals WRT outside.

15. If duct pressure reading goes negative, slowly bring up duct blaster fan speed until duct pressure equals 0 Pascals WRT Unit pressure (duct blaster manometer channel A), installing flow reducing plates and adjusting manometer configuration as necessary.

16. Record duct blaster airflow volume at 25 Pascals ΔP WRT outside ("CFM25").

17. Replace furnace filter and return HVAC system to previous settings.