


The Albuquerque Energy Conservation Code



Mayor Martin J. Chávez

ALBUQUERQUEGREEN

VOLUME I
COMMERCIAL AND
MULTI - FAMILY
RESIDENTIAL BUILDINGS

PREFACE

(By Mayor Martin Chavez)

HOW TO USE VOLUME I OF THE ALBUQUERQUE ENERGY CONSERVATION CODE

- I. THE 2007 ALBUQUERQUE ENERGY CONSERVATION CODE – VOLUME I ADOPTS AND AMENDS ASHRAE STANDARD 90.1 – 2004.**
- II. SECTION AND TABLE NUMBERS THAT ARE IDENTIFIED IN THE 2007 ALBUQUERQUE ENERGY CONSERVATION CODE AMEND THE CORRESPONDING SECTIONS AND TABLES IN ASHRAE STANDARD 90.1 – 2004.**
- III. THE AMENDED PROVISIONS OF THE 2007 ALBUQUERQUE ENERGY CONSERVATION CODE SUPERSEDE THE CORRESPONDING PROVISIONS OF ASHRAE 90.1 – 2004.**
- IV. THE 2007 ALBUQUERQUE ENERGY CONSERVATION CODE MUST BE USED IN CONJUNCTION WITH ASHRAE STANDARD 90.1 – 2004.**
- V. THE NEW MEXICO ENERGY CONSERVATION CODE IS NOT ADOPTED BY THE CITY OF ALBUQUERQUE.**

SECTION 1 TITLE AND INTENT

- 1.1 Title.** This code shall be known as the *Albuquerque Energy Conservation Code - Volume I* and shall be cited as such. It is referred to herein as “this code”.
- 1.2 Intent.** This code shall regulate the design and construction of buildings for the effective use of energy. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve the effective use of energy and to reduce greenhouse gas emissions in Albuquerque. This code is not intended to abridge safety, health, or environmental requirements contained in other applicable codes or ordinances.
- 1.3 Adopted Standard, Referenced Standards, Normative Appendices, and Informative Appendices.**
- 1.3.1 Adopted Standard.** This code adopts, and amends, ASHRAE Standard 90.1-2004. Where differences occur between the provisions of this code and ASHRAE Standard 90.1-2004, the provisions of this code shall apply.
- 1.3.2 Referenced Standards.** The standards referenced in this code and listed in Section 12 shall be considered part of the requirements of this code to the extent that they are referenced. Where differences occur between the provisions of this code and a referenced standard, the provisions of this code shall apply. Informative references are cited to acknowledge sources and are not part of this code. They are identified in Informative Appendix E.
- 1.3.3 Normative Appendices.** The normative appendices to this code are considered to be integral parts of the mandatory requirements of this code, which for reasons of convenience, are placed apart from all other normative elements.
- 1.3.4 Informative Appendices.** The informative appendices of this code and informative notes located within this code contain additional information and are not mandatory or part of this code.
- 1.4 Validity.** If any term, part, provision, section, paragraph, subdivision, table, chart, or referenced standard of this code shall be held unconstitutional, invalid, or ineffective, in whole or in part, such determination shall not be deemed to invalidate any remaining term, part, provision, section, paragraph, subdivision, table, chart, or referenced standard of this code.
- 1.5 Other Laws.** The provisions of this code shall not be deemed to nullify any provision of local, state, or federal law. Where there is a conflict between a requirement of this code and such other law affecting construction of the building, precedence shall be determined in accordance with the provisions of the Albuquerque Uniform Administrative Code.

SECTION 2

SCOPE

2.1 This code applies to commercial and multi-family residential buildings.

2.2 This code provides:

- (a) minimum energy efficient requirements for the design and construction of:
 - 1. new buildings and their systems,
 - 2. new portions of buildings and their systems, and
 - 3. new systems and equipment in existing buildings
- (b) criteria for determining compliance with these requirements.

2.3 The provisions of this standard apply to:

- (a) the envelope of buildings, provided that the enclosed spaces are:
 - 1. heated by a heating system whose output capacity is greater than or equal to 3.4 Btu/h·ft², or
 - 2. cooled by a cooling system whose sensible output capacity is greater than or equal to 5 Btu/h·ft².
- (b) the following systems and equipment used in conjunction with buildings:
 - 3. heating, ventilating, and air-conditioning,
 - 4. service water heating,
 - 5. electric power distribution and metering provisions,
 - 6. electric motors and belt drives, and
 - 7. lighting.

2.4 The provisions of this code do not apply to:

- (a) buildings that do not use fossil fuels or electricity produced by fossil fuels,
- (b) buildings certified as LEED Silver (4 energy points, minimum) or greater,
- (c) historic buildings,
- (d) equipment and portions of building systems that use energy primarily to provide for industrial, manufacturing, or commercial processes, and
- (e) other buildings or elements of buildings specifically noted in this code

SECTION 3 DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

Section 3 of ASHRAE Standard 90.1 is adopted as part of this code with the following revision:

historic buildings: buildings that are (1) listed in the State or National Register of Historic Places; (2) designated as a historic property under local or state designation law or survey; (3) certified as a contributing resource within a national register listed, or locally designated, historic district; (4) that, in the written opinion of the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are eligible to be listed in the National or State Registers of Historic Places either individually, or as a contributing building within a historic district.

SECTION 4 ADMINISTRATION AND ENFORCEMENT

4.1 General

4.1.1 Scope

4.1.1.1 New Buildings. New buildings shall comply with this code as described in Section 4.2.

4.1.1.2 Additions to Existing Buildings. An extension or increase in the floor area or height of a building outside of the existing building envelope shall be considered additions to existing buildings and shall comply with this code as described in Section 4.2.

4.1.1.3 Alterations of Existing Buildings. Alterations of existing buildings shall comply with this code as described in Section 4.2.

4.1.1.4 Change in Occupancy. Buildings or spaces undergoing a change of occupancy that would result in an increased demand for either fossil fuel or electrical energy shall comply with the requirements of this code as if the building were new.

4.1.1.5 Replacement of Portions of Existing Buildings. Portions of a building envelope, heating, ventilating, air-conditioning, service water heating, power, lighting, and other systems and equipment that are being replaced shall be considered as Alterations of Existing Buildings and shall comply with this code as described in Section 4.2.

4.1.1.6 Changes in Space Conditioning. Whenever unconditioned or semiheated spaces in a building are converted to conditioned spaces, such conditioned spaces shall be brought into compliance with all the applicable requirements of this code that would apply to the building envelope, heating, ventilating, air-conditioning, service water heating, power, lighting, and other systems and equipment of the space as if the building were new.

4.1.2 Administrative Requirements. Administrative requirements relating to permits, inspections, fees, interpretations, and rights of appeal are specified in the Albuquerque Uniform Administrative Code.

4.1.3 Alternative Materials, Methods of Construction, or Design. The provisions of this code are not intended to prevent the use of any material, method of construction, design, equipment, or building system not specifically prescribed herein.

4.2 Compliance

4.2.1 Compliance Paths

4.2.1.1 New Buildings. New buildings shall comply with the provisions of Sections 5.2, 6.2, 7.2, 8.2, 9.2, and 10.2 of this code.

4.2.1.2 Additions to Existing Buildings. Additions to existing buildings shall comply with the provisions of Sections 5.2, 6.2, 7.2, 8.2, 9.2, and 10.2 of this code.

Exception to 4.2.1.2. When an addition to an existing building cannot comply, trade-offs will be allowed by modification to one or more of the components of the existing building. Modeling of the modified components of the existing building and addition shall employ the procedures of Section 11 of this code. The addition shall not increase the total energy consumption beyond the energy that would be consumed by the existing building plus the compliant addition.

4.2.1.3 Alterations of Existing Buildings. Alterations of existing buildings shall comply with the provisions of Sections 5.1, 6.1, 7.1, 9.1, and 10.1 of this code, provided, however that nothing in this code shall require compliance with any provision of this code if such compliance will result in the increase of energy consumption of the building.

Exceptions to 4.2.1.3:

- (a) Alterations of existing buildings that comply with Sections 5.2, 6.2, 7.2, 9.2, and 10.2 of this code.
- (b) Historic buildings, as defined herein, need not comply with these requirements.
- (c) Where one or more components of an existing building or portions thereof are replaced, the annual energy consumption of the comprehensive design shall not exceed the annual energy consumption of a substantially identical design using the same energy types.

4.2.2 Compliance Documentation

4.2.2.1 Construction Details. Compliance documents shall show all the pertinent data and features of the building, equipment, and systems in sufficient detail to permit a determination of compliance by the building official and to indicate compliance with the requirements of this code.

4.2.2.2 Supplemental Information. Supplemental information necessary to verify compliance with this code, such as calculations, worksheets, compliance forms, vendor literature, or other data, shall be made available when required by the building official.

4.2.2.3 Manuals. Operating and maintenance information shall be provided to the building owner. This information shall include, but not be limited to, the information specified in Sections 6.7.2.2 and 8.7.2 of this code.

4.2.3 Labeling of Material and Equipment. Materials and equipment shall be labeled in a manner that will allow for a determination of their compliance with the applicable provisions of this code.

4.2.4 Energy Performance Inspections. All building construction, additions, or alterations subject to the provisions of this code shall be subject to the inspections listed in Table 4.2.4 of this code. All such work shall remain accessible and exposed for inspection purposes until approved in accordance with the procedures specified in the Albuquerque Uniform Administrative Code.

TABLE 4.2.4
ENERGY PERFORMANCE INSPECTIONS

	COMPONENT	CODE REFERENCES <i>This column intentionally left blank</i>	WHEN INSPECTED
Thermal Envelope	1. Slab Insulation		Foundation Insulation Inspection
	2. Thermal Bypass		Thermal Bypass Inspection
	3. Frame Insulation		Frame Insulation
	4. Roof Ventilation		Building Final
	5. Roof Reflectance (after 1/1/2009)		Building Final
Air Leakage	1. Building Thermal Envelope		Thermal Bypass Inspection
	2. Fenestration		Building Final
	3. Recessed Lighting		Thermal Bypass Inspection/ Electrical Rough-In
Heating, Ventilating, and Air-Conditioning System	1. Duct Sealing and Support		Below Slab: Duct Groundwork Inspection Above Slab: Heating/Cooling Top-Out
	2. Duct Insulation		Below Slab: Duct Groundwork Inspection Above Slab: Heating/Cooling Top-Out
	3. Pipe Insulation		Below Slab: Plumbing Groundwork Inspection Above: Plumbing Top-out
	4. Equipment Efficiency		Appliance Final
	5. Controls		Heating/Cooling Final
Service Water Heating System	1. Pipe Insulation		Below Slab: Plumbing Groundwork Inspection Above Slab: Plumbing Top-out
	2. Equipment Efficiency		Appliance Final
	3. Controls		Plumbing Final
	4. Conservation of Hot Water		Plumbing Final
	5. Heat Trap		Plumbing Top-out
Heated Swimming Pools	1. Pipe Insulation		Pool/solar Heating Rough-In
	2. Energy Source		Pool/Solar Heating Rough-In
	3. Insulating Cover		Pool Final
	4. Controls		Pool Final
Electrical Lighting	1. Lighting Efficiency		Recessed Fixtures: Electrical; Rough-In Surface – Mounted Fixtures and Luminaires: Electrical Final

SECTION 5 BUILDING ENVELOPE

5.1 General. *Delete ASHRAE Standard 90.1-2004 provisions for Section 5.1 and replace with the following:*

5.1.1 Scope. Section 5 specifies requirements for the building envelope.

5.1.2 Space-Conditioning Categories.

5.1.2.1 Spaces, including shell spaces, shall be assumed to be conditioned space and shall comply with the requirements for conditioned space at the time of construction, regardless of whether mechanical or electrical equipment is included in the building permit application or installed at that time.

5.1.2.2 A space may be designated as unconditioned only if approved by the building official.

5.1.3 Envelope Alterations. Alterations to the building envelope shall comply with Section 5 of ASHRAE Standard 90.1-2004 for insulation, air leakage, and fenestration applicable to those specific portions of the building that are being altered.

Exceptions to 5.1.3: The following alterations need not comply with these requirements, provided such alterations will not increase the energy usage of the building:

- (a) installation of storm windows over existing glazing,
- (b) replacement of glazing in existing sash and frame provided the U-factor and SHGC will be equal to or lower than before the glass replacement,
- (c) alterations to single rafter roof, wall, or floor cavities which are insulated to full depth with insulation having a minimum nominal value of R-3.5 per inch of thickness,
- (d) replacement of a roof membrane where either the roof sheathing or roof insulation is not exposed provided, however, that the replacement roof membrane shall comply with the solar reflectance requirements in Table 5.3-1 of this code, regardless of the use of the building.
- (e) replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed, and
- (f) replacement of existing fenestration provided, however, that the area of the replacement fenestration does not exceed 25% of the total fenestration area of an existing building and that the U-factor and SHGC will be equal to, or lower than, before the fenestration replacement.

5.1.4 Climate.

5.1.4.1 Heating Degree-Days (HDD65). Albuquerque has 4,425 annual heating degree-days.

5.1.4.2 Cooling Degree-Days (CDD50). Albuquerque has 3,908 cooling degree-days.

5.1.4.3 Climate Zone. Albuquerque is in climate zone 4.

5.2 Compliance Paths. *Delete ASHRAE Standard 90.1-2004 provisions for Section 5.2 and replace with the following:*

5.2.1 Compliance. Compliance with Section 5 shall be achieved by meeting all of the requirements for 5.1, General; 5.4, Mandatory Provisions; 5.7, Submittals; and 5.8, Product and Installation Requirements; and either

(a) 5.3, Simplified Approach Option for Building Envelope; or

(b) 5.5, Performance Rating Method.

5.3 Simplified Approach Option for Building Envelope

5.3.1 Scope: The simplified approach is an optional path for compliance when the following conditions are met:

(a) the gross floor area of the building is 20,000 square feet or less, and

(b) the building uses unitary heating and air-conditioning equipment, and

(c) it is an office building, or

(d) it is a retail building

Exception to 5.3.1: Car washes, laundry and dry-cleaning establishments, gasoline service stations, repair garages, food service facilities such as delicatessens and restaurants, personal service establishments such as barber shops, hair salons and nail salons, and other facilities that have significant point source heat or pollutant generation are excluded from using this approach.

5.3.2 Criteria:

5.3.2.1 Office Buildings. The building envelope shall comply with Table 5.3-1.

5.3.2.2 Retail Buildings. The building envelope shall comply with Table 5.3-2.

5.3.3 Compliance Documentation. The registered design professional shall submit a checklist verifying that each of the items listed in Table 5.3-1 or 5.3-2 has been incorporated into the design of the building and where a reference to each of the items can be found in the construction drawings.

5.4 Mandatory Provisions. *Section 5.4 of ASHRAE Standard 90.1 is adopted as written but with the following change:*

5.4.1 Insulation. Where insulation is required it shall comply with the requirements found in 5.8.1.1 through 5.8.1.9.

Delete ASHRAE Standard 90.1-2004 provisions for Section 5.5, including tables, and replace with the following:

5.5 Performance Rating Method.

5.5.1 The building envelope complies with this code if the *proposed building* is 30% more energy efficient than a *baseline building* that meets the minimum standards of ASHRAE Standard 90.1-1999.

5.5.1.1 Performance rating calculations and documentation shall be in accordance with Chapter 11, “Performance Rating Method”, of this code and shall be submitted, in duplicate, with each application for a building permit. Documentation, including calculations, shall be prepared by a registered design professional.

5.6 Building Envelope Trade-Off Option. *Delete Section 5.6 of ASHRAE Standard 90.1-2004 in its entirety.*

5.7 Submittals. *Delete Section 5.7 of ASHRAE Standard 90.1-2004 in its entirety.*

5.8 Product Information and Installation Requirements. *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 5.8.*

TABLE 5.3-1
BUILDING ENVELOPE REQUIREMENTS FOR SMALL OFFICE BUILDINGS

Item	Component	Requirement (Minimum or Maximum)
Roof	Insulation entirely above deck Metal building Attic and other Single rafter Solar reflectance Index (SRI): Low Slope ^b Steep Slope ^c	R-20 c.i. R-13 + R-19 ^a R-38 R-38 0.65 ^d 0.25 ^d
Walls	Mass (HC > 7 Btu/ft ²) Metal building Steel framed Wood framed and other Below-grade walls	R-11.4 c.i. R-19 R-13 + R-7.5 c.i. ^e R-19 R-13 or R-10 c.i.
Floors	Mass Steel framed Wood framed and other	R-8.3 c.i. R-30 R-30
Slabs	Unheated Heated	R-5 for 24 in. R-10 for 24 in. plus R-10 c.i. under slab
Doors	Swinging Non-swinging	U-0.70 U-0.50
Vertical Glazing	Window to wall ratio (WWR) Thermal transmittance Solar heat gain coefficient (SHGC) Window orientation Exterior sun control (S, E, W only)	20% to 40% maximum U-0.42 N, S, E, W - 0.46 N only - 0.46 $(A_N \times SHGC_N + A_S \times SHGC_S) >$ $(A_E \times SHGC_E + A_W \times SHGC_W)$ Projection factor 0.5
Sky Lights	Maximum percent of roof area Thermal transmittance Solar heat gain coefficient (SHGC)	3% U-0.69 0.34

c.i. = continuous insulation

- a. R-13 installed continuously perpendicular to the exterior of the girts and R-19 installed parallel to the girts within the framing cavity
- b. Low slope = 2 inches in 12, or less
- c. Steep slope = greater than 2 inches in 12
- d. Initial solar reflectance as determined by the Cool Roof Rating Council
- e. R-13 installed within framing cavity plus R-7.5 continuous foam sheathing applied to exterior side of framing

TABLE 5.3-2
BUILDING ENVELOPE REQUIREMENTS FOR SMALL RETAIL BUILDINGS

Item	Component	Requirement (Minimum or Maximum)
Roof	Insulation entirely above deck Metal building Attic and other Single rafter Solar Reflectance Index (SRI): Low Slope ^b Steep Slope ^c	R-20 c.i. R-13 + R-19 ^a R-38 R-38 + R-5 c.i. No recommendation 0.65 ^d 0.25 ^d
Walls	Mass (HC > 7 Btu/ft ²) Metal building Steel framed Wood framed and other Below-grade walls	R-13.3 c.i. R-13 + R-13 ^e R-13 + R-7.5 c.i. ^f R-13 + R-5 c.i. ^f R13 or R-10 c.i.
Floors	Mass Steel framed Wood framed and other	R-12.5 c.i. R-30 R-30
Slabs	Unheated Heated	R-5 for 24 in R-10 for 24 in. plus R-10 c.i. under slab
Doors – Opaque	Swinging Non-swinging	U-0.50 U-0.50
Vertical Glazing Including Doors	Area (percent of gross wall) Thermal transmittance Solar heat gain coefficient (SHGC) Exterior sun control (S, E, W only)	40% U-0.38 N, S, E, W - 0.41; N only - 0.41 Projection factor > 0.5
Skylights	Area (percent of gross roof) Thermal transmittance Solar heat gain coefficient (SHGC)	3% U-0.69 0.32

c.i. = continuous insulation

- a. First layer of insulation is draped perpendicularly over the purlins with enough looseness to allow second layer of insulation to be laid above it and parallel to the purlins
- b. Low slope = 2 inches in 12, or less
- c. Steep slope = greater than 2 inches in 12
- d. Initial solar reflectance as determined by the Cool Roof Rating Council
- e. R-13 installed continuously perpendicular to the exterior of the girts plus R-13 installed parallel to the girts within the framing cavity.
- f. R-13 installed within framing cavity plus continuous insulating foam sheathing applied to exterior side of framing

SECTION 6

HEATING, VENTILATING, AND AIR CONDITIONING

6.1 General. *Section 6.1 of ASHRAE Standard 90.1-2004 is adopted as written but with the following change:*

6.1.1.3 Alterations to Heating, Ventilating, and Air-Conditioning in Existing Building.

6.1.1.3.1 New HVAC equipment as a direct replacement of existing HVAC equipment shall comply with the specific minimum efficiency requirements applicable to that equipment.

6.1.1.3.2 New cooling systems installed to serve previously uncooled spaces shall comply with this section as described in 6.2.

6.1.1.3.3 Alterations to existing cooling systems shall not decrease economizer capability unless specifically approved by the building official.

6.1.1.3.4 New and replacement ductwork shall comply with 6.4.4.1 and 6.4.4.2.

6.1.1.3.5 New and replacement piping shall comply with 6.4.4.1.

Exceptions to 6.1.1.3: Compliance shall not be required:

- (a) for equipment that is being modified or repaired but not replaced, provided that such modifications and/or repairs will not result in an increase in the annual energy consumption of the equipment using the same energy type, or
- (b) where a replacement or alteration of equipment requires extensive revisions to other systems, equipment, or elements of a building, and such replaced or altered equipment is a like-for-like replacement, or
- (c) for a refrigerant change of existing equipment, or
- (d) for portions of ducts and pipes where there is insufficient space or access to meet these requirements.

6.2 Compliance Paths. *Delete ASHRAE Standard 90.1 provisions for Section 6.2 and replace with the following:*

6.2.1 Compliance. Compliance with Section 6 shall be achieved by meeting all of the requirements for 6.1, General; 6.4, Mandatory Provisions; 6.7, Submittals; 6.8 Minimum Equipment Efficiency; and either

- (a) 6.3, Simplified Approach Option for HVAC Systems and Equipment; or
- (b) 6.5, Performance Rating Method.

6.3 Simplified Approach Option for HVAC Systems and Equipment

6.3.1 Scope: The simplified approach is an optional path for compliance when the following conditions are met:

- (a) the gross floor area of the building is 20,000 square feet, or less, and
- (b) the building uses unitary heating and air-conditioning equipment, and
- (c) it is an office building, or
- (d) it is a retail building

Exception to 6.3.1: Car washes, laundry and dry-cleaning establishments, gasoline service stations, repair garages, food service facilities such as delicatessens and restaurants, personal service establishments such as barber shops, hair salons and nail salons, and other facilities that have significant point source heat or pollutant generation are excluded from using this approach.

6.3.2 Criteria:

6.3.2.1 Office Buildings. The HVAC system and equipment shall comply with Table 6.3-1.

6.3.2.2 Retail Buildings. The HVAC system and equipment shall comply with Table 6.3-2.

6.3.3 Compliance Documentation. The registered design professional shall submit a checklist verifying that each of the items listed in Table 6.3-1 or 6.3-2 has been incorporated into the design of the building and where a reference to each of the items can be found in the construction drawings.

6.4 Mandatory Provisions. *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 6.4.*

Delete ASHRAE Standard 90.1-2004 provisions for Section 6.5, including tables, and replace with the following:

6.5 Performance Rating Method.

6.5.1 Criteria: The HVAC system and equipment complies with this code if the *proposed building* is 30% more energy efficient than a *baseline building* that meets the minimum standards of ASHRAE Standard 90.1-1999.

6.5.2 Compliance Documentation: Performance rating calculations and documentation shall be in accordance with Chapter 11, “Performance Rating Method”, of this code and shall be submitted, in duplicate, with each application for a building permit. Documentation, including calculations, shall be prepared by a registered design professional.

6.6 Alternative Compliance Path: (Not Used)

6.7 Submittals. *Delete Section 6.7 of ASHRAE Standard 90.1-2004 in its entirety.*

6.8 Minimum Equipment Efficiency Tables. *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 6.8.*

TABLE 6.3-1
HVAC REQUIREMENTS FOR SMALL OFFICE BUILDINGS

Item	Component	Requirement (Minimum or Maximum)
HVAC	Air conditioner (0-65 kBtuh) Air conditioner (>65-135 kBtuh) Air conditioner (>135-240 kBtuh) Air conditioner (>240 kBtuh) Gas furnace (0-225 kBtuh - SP) Gas furnace (0-225 kBtuh - Split) Gas furnace (>225 kBtuh) Heat pump (0-65 kBtuh) Heat pump (>65-135 kBtuh) Heat pump (>35 kBtuh)	14.0 SEER 11.0 EER/11.4 IPLV 10.8 EER/11.2 IPLV 10.0 EER/10.4 IPLV 90% AFUE 90% AFUE 80% E _c 14.0 SEER/8.0 HSPF 10.6 EER/1 1.0 IPLV/3.2 COP 10,1 EER/11.0 IPLV/3.1 COP
Economizer	Air conditioners & heat pumps - SP	Cooling capacity > 54 kBtuh
Ventilation	Outdoor air damper Demand control	Motorized control CO ₂ sensors
Ducts	Friction rate Sealing Location Insulation level	0.08 in. w.c./100 feet Seal class B Interior only R-8 (R-6 in floor trusses)

**TABLE 6.3-2
HVAC REQUIREMENTS FOR SMALL RETAIL BUILDINGS**

Item	Component	Requirement (Minimum or Maximum)
HVAC	Air conditioner (0-65 kBtuh) Air conditioner (>65-135 kBtuh) Air conditioner (>135-240 kBtuh) Air conditioner (>240 kBtuh) Gas furnace (0-225 kBtuh - SP) Gas furnace (0-225 kBtuh - Split) Gas furnace (>225 kBtuh) Heat pump (0-65 kBtuh) Heat pump (>65-135 kBtuh) Heat pump (>135 kBtuh)	14.0 SEER 11.0 EER/11.4 IPLV 10.8 EER/11.2 IPLV 10.0 EER/10.4 IPLV 90% AFUE 90% AFUE 80% E _c 14.0 SEER/8.0 HSPF 10.6 EER/11.0 IPLV/3.2 COP 10.1 EER/11.0 IPLV/3.1 COP
Economizer	Air conditioners & heat pumps - SP	Cooling capacity > 54 kBtuh
Ventilation	Outdoor air damper Demand control	Motorized control CO ₂ sensors
Ducts	Friction rate Sealing Location Insulation level	0.08 in. w.c./100 feet Seal class B Interior only R-8 (R-6 in floor trusses)

SECTION 7 SERVICE WATER HEATING

7.1 General. *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 7.1.*

7.2 Compliance Paths. *Delete ASHRAE Standard 90.1-2004 provisions for Section 7.2 and replace with the following:*

7.2.1 Compliance. Compliance shall be achieved by meeting all of the requirements for 7.1, General; 7.4, Mandatory Provisions; 7.8, Product Information; and either

- (a) 7.3, Simplified Approach Option for Service Water Heating Systems and Equipment; or
- (b) 7.5, Performance Rating Method.

7.3 Simplified Approach Option for Service Water Heating Systems and Equipment.

7.3.1 Scope: The simplified approach is an optional path for compliance when the following conditions are met:

- (a) the gross floor area of the building is 20,000 square feet, or less, and
- (b) the building uses unitary heating and air-conditioning equipment, and
- (c) it is an office building, or
- (d) it is a retail building

Exception to 7.3.1: Car washes, laundry and dry-cleaning establishments, gasoline service stations, repair garages, food service facilities such as delicatessens and restaurants, personal service establishments such as barber shops, hair salons, and nail salons, and other facilities that have significant source heat or pollutant generation are excluded from using this approach.

7.3.2 Criteria:

7.3.2.1 Office Buildings. The service water heating system and equipment shall comply with Table 7.3-1.

7.3.2.2 Retail Buildings. The service water heating system and equipment shall comply with Table 7.3-2.

7.3.3 Compliance Documentation. The registered design professional shall submit a checklist verifying that each of the items listed in Table 7.3-1 or 7.3-2 has been incorporated into the design of the building and indicating where each of those items is referenced in the construction drawings.

7.4 Mandatory Provisions. Refer to ASHRAE Standard 90.1-2004 for the provisions of section 7.4.

Delete section 7.5 of ASHRAE Standard 90.1-2004 and replace with the following:

7.5 Performance Rating Method.

7.5.1 Criteria: The service water heating system and equipment complies with this code if the *proposed building* is 30% more energy efficient than a *baseline building* that meets the minimum standards of ASHRAE Standard 90.1-1999.

7.5.2 Compliance Documentation. Performance rating calculations and documentation shall be in accordance with Chapter 11, "Performance Rating Method", of this code and shall be submitted, in duplicate, with each application for a building permit. Documentation, including calculations, shall be prepared by a registered design professional.

7.6 Alternative Compliance Path (Not Used).

7.7 Submittals. *Delete section 7.7 of ASHRAE Standard 90.1-2004 in its entirety.*

Table 7.8, Performance Requirements for Water Heating Equipment. *Refer to ASHRAE Standard 90.1-2004 for the provisions of Table 7.8.*

**TABLE 7.3-1
SERVICE WATER HEATING REQUIREMENTS
FOR SMALL RETAIL BUILDINGS**

Item	Component	Requirement (Minimum or Maximum)
Service Water Heating	Gas tankless	0.81 EF ^a
	Advanced non-condensing gas storage water heaters	0.70EF ^b
	Gas condensing water heaters	0.80EF ^b
	Electric storage 12 kW ^c	EF>0.99 - 0.0012 x Volume
	Solar	Solar fraction of 0.50 and OG-300 certification from the SRCC
	Pipe insulation (d<1½ in./d≥1½ in.)	1 in./ 1½ in.

SRCC = The Solar Rating and Certification Corporation

- a. 3.5 gallons-per-minute at 77°F rise
- b. First-hour rating of 50 gallons-per-hour
- c. May be approved by Code Official where it is shown that natural gas is not available; otherwise not permitted

**TABLE 7.3-2
SERVICE WATER HEATING REQUIREMENTS
FOR SMALL RETAIL BUILDINGS**

Item	Component	Requirement (Minimum or Maximum)
Service Water Heating	Gas tankless	0.81 EF ^a
	Advanced non-condensing gas storage water heater	0.70EF ^b
	Gas condensing water heaters	0.80EF ^b
	Electric storage 12 kW ^c	EF>0.99 - 0.0012 x Volume
	Solar	Solar fraction of 0.50 and OG-300 certification from the SRCC
	Pipe insulation (d<1½ in./d≥1½ in.)	1 in./ 1½ in.

SRCC = The Solar Rating and Certification Corporation

- a. 3.5 gallons-per-minute at 77°F rise
- b. First-hour rating of 50 gallons-per-hour
- c. May be approved by Code Official where it is shown that natural gas is not available; otherwise not permitted

SECTION 8 POWER

Adopt Section 8 of ASHRAE Standard 90.1-2004 as written.

SECTION 9 LIGHTING

9.1 General. *Section 9.1 of ASHRAE Standard 90.1-2004 is adopted as written except for the following:*

9.1.2 Lighting Alterations. New lighting systems and the replacement of lighting systems in any existing building space shall comply with the lighting power density requirements of Table 9.1-1 of this code for that space. Any new control devices as a direct replacement of existing control devices shall comply with the specific requirements of 9.4.1.2(b).

Exception to 9.1.2: Alterations that replace less than 50% of the luminaries in a space need not comply with requirements provided that such alterations do not increase the installed interior lighting power.

9.2 Compliance Paths. *Delete ASHRAE Standard 90.1-2004 provisions for Section 9.2 and replace with the following:*

9.2.1 Compliance. Lighting systems and equipment shall comply with 9.1, General; 9.4, Mandatory Provisions; and either

- (a) 9.3, Simplified Approach Option for Lighting Systems and Equipment; or
- (b) 9.5, Performance Rating Method

9.3 Simplified Approach Option for Lighting Systems and Equipment.

9.3.1 Scope: The simplified approach is an optional path for compliance when the following conditions are met:

- (a) the gross floor area of the building is 20,000 square feet, or less, and
- (b) the building uses unitary heating and air-conditioning equipment, and
- (c) it is an office building, or
- (d) it is a retail building

Exception to 9.3.1: Car washes, laundry and dry-cleaning establishments, gasoline service stations, repair garages, food service facilities such as delicatessens and restaurants, personal service facilities that have significant point source heat or pollutant generation, are excluded from this approach.

9.3.2 Criteria:

9.3.2.1 Office Buildings. Lighting shall comply with Table 9.3-1.

9.3.2.2 Retail Buildings. Lighting shall comply with Table 9.3-2.

9.3.3 Compliance Documentation. The registered design professional shall submit a checklist verifying that each of the items listed in Table 9.3-1 or 9.3-2 has been incorporated into the design of the building and where a reference to each of these items can be found in the construction drawings.

9.4 Mandatory Provisions. *Section 9.4 of ASHRAE Standard 90.1-2004 is adopted as written except for the following:*

9.4.1.1 Automatic Lighting Shutoff. Interior lighting in buildings shall be controlled with an automatic control device to shut off building lighting in all spaces. This automatic control device shall function on either

- (a) a scheduled basis using a time-of-day operated control device that turns lighting off at specific programmed times (an independent program schedule shall be provided for areas of no more than 25,000 square feet but not more than one floor), or
- (b) an occupant sensor that shall turn lighting off within 30 minutes of an occupant leaving a space,
- (c) a signal from another control or alarm system that indicates the area is unoccupied.

Exceptions to 9.4.1.1: The following shall not require an automatic control device:

- (a) Lighting intended for 24-hour operation
- (b) Lighting in spaces where patient care is rendered
- (c) Spaces where an automatic shutoff would endanger the safety or security of the room or building occupant(s).

9.5 Performance Rating Method.

9.5.1 Criteria: The lighting system and equipment complies with this code if the *proposed building* is 30% more energy efficient than a *baseline building* that meets the minimum standards of ASHRAE Standard 90.1-1999.

9.5.2 Compliance Documentation. Performance rating calculations and documentation shall be in accordance with Chapter 11, “Performance Rating Method”, of this code and shall be submitted, in duplicate, with each application for a building permit. Documentation, including calculations, shall be prepared by a registered design professional.

TABLE 9.1-1
ALLOWABLE LIGHTING POWER DENSITIES FOR EXISTING BUILDINGS
UNDERGOING ALTERATIONS

Building Type	Lighting Power Density (W/ft², Maximum)
Automotive Facility	0.9
Convention Center	1.2
Court House	1.2
Dining: Bar Lounge/Leisure	1.3
Dining: Cafeteria/Fast Food	1.4
Dining: Family	1.6
Dormitory	1.0
Exercise Center	1.0
Gymnasium	1.1
Health Care-Clinic	1.0
Hospital	1.2
Hotel	1.0
Library	1.3
Manufacturing Facility	1.3
Motel	1.3
Motion Picture Theater	1.2
Multi-Family	0.7
Museum	1.1
Office	1.0
Parking Garage	0.3
Penitentiary	1.0
Performing Arts Theater	1.6
Police/Fire Station	1.0
Post Office	1.1
Religious Building	1.3
Retail	1.5
School/University	1.2
Sports Arena	1.1
Town Hall	1.1
Transportation	1.0
Warehouse	0.8
Workshop	1.4

TABLE 9.3-1
LIGHTING REQUIREMENTS FOR SMALL OFFICE BUILDINGS

Item	Component	Requirement (Minimum or Maximum)
Interior Lighting	Lighting power density (LPD)	0.9 W/ft ²
	Light source (linear fluorescent)	90 mean lumens/watt
	Ballast	Electronic ballast
	Dimming controls for daylight harvesting for WWR 25% or higher	Dim fixtures within 12 ft of N/S window wall or within 8 ft of skylight edge
	Occupancy controls	Auto-off all unoccupied rooms
	Interior room surface reflectances	80%+ on ceilings, 70%+ on walls and vertical partitions

TABLE 9.3-2
LIGHTING REQUIREMENTS FOR SMALL RETAIL BUILDINGS

Item	Component	Requirement (Minimum or Maximum)
Interior Lighting	Lighting power density (LPD)	0.9 W/ft ²
	Light source (linear fluorescent)	90 mean lumens/watt
	Ballast	Electronic ballast
	Dimming controls for daylight harvesting for WWR 25% or higher	Dim fixtures within 12 ft of N/S window wall or within 8 ft of skylight edge
	Occupancy controls	Auto-off all unoccupied rooms
	Interior room surface reflectances	80%+ on ceilings, 70%+ on walls and vertical partitions
Additional Interior Lighting for Sales Floor	Additional LPD for adjustable lighting equipment that is specifically designed and directed to highlight merchandise and is automatically controlled separately from the general lighting	0.4 W/ft ² (spaces not listed below) 0.6 W/ft ² (sporting goods, small electronics) 0.9 W/ft ² (furniture, clothing, cosmetics, and artwork) 1.5 W/ft ² (jewelry, crystal, china)
	Sources	Halogen IR or CMH
Exterior	Façade and externally illuminated signage	0.2 W/ft ²

SECTION 10 OTHER EQUIPMENT

10.1 General. Refer to ASHRAE Standard 90.1-2004 for the provisions of 10.1.

10.2 Compliance Paths. Delete ASHRAE Standard 90.1-2004 provisions for section 10.2 and replace with the following:

10.2.1 Compliance with Section 10 shall be achieved by meeting all requirements of 10.1, General; 10.4, Mandatory Provisions; and 10.8, Product Information.

10.2.2 Projects using the Simplified Approach Option (Sections 5.3, 6.3, 7.3, and 9.3 of this code) must comply with 10.4, the Mandatory Provisions of this section, as a portion of that compliance path.

10.2.3 Projects using the Performance Rating Method (Sections 5.5, 6.5, 7.5, and 9.5 of this code) must comply with 10.4, the Mandatory Provisions of this section, as a portion of that compliance path.

10.3 Not Used.

10.4 **Mandatory Provisions.** *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 10.4.*

10.5 Not Used.

10.6 Not Used.

10.7 Not Used.

10.8 *Refer to ASHRAE Standard 90.1-2004 for the provisions of Section 10.8.*

Table 10.8 *Refer to ASHRAE Standard 90.1-2004 for the provisions of Table 10.8.*

Delete Section 11 of ASHRAE Standard 90.1-2004 in its entirety and substitute the following:

SECTION 11 PERFORMANCE RATING METHOD

Informative Appendix G, “Performance Rating Method”, of ASHRAE Standard 90.1-2004 is adopted in its entirety as Section 11 of this code.

SECTION 12 NORMATIVE REFERENCES

Section 12 of ASHRAE Standard 90.1-2004 is adopted as part of this code with the following addition:

**American Society of Heating, Refrigerating, and Air-Conditioning Engineers,
1791 Tullie Circle, NE, Atlanta, GA 30329**

ANSI/ASHRAE Standard 90.1-1999 Energy Standard for Buildings Except Low-Rise Residential Buildings

NORMATIVE APPENDIX A RATED R-VALUE OF INSULATION AND ASSEMBLY U-FACTOR, C-FACTOR, AND F-FACTOR DETERMINATIONS

Normative Appendix A of ASHRAE Standard 90.1-2004 is adopted as written.

NORMATIVE APPENDIX B BUILDING ENVELOPE CLIMATE CRITERIA

Normative Appendix B of ASHRAE Standard 90.1-2004 is adopted as written.

**NORMATIVE APPENDIX C
METHODOLOGY FOR BUILDING ENVELOPE
TRADE-OFF OPTION IN SUBSECTION 5.6**

Normative Appendix C of ASHRAE Standard 90.1-2004 is deleted in its entirety.

**NORMATIVE APPENDIX D
CLIMATIC DATA**

Normative Appendix D of ASHRAE Standard 90.1-2004 is adopted as written.

**INFORMATIVE APPENDIX E
INFORMATIVE REFERENCES**

Informative Appendix E of ASHRAE Standard 90.1-2004 is included as part of this code but with the following additions:

5.3, 6.3, 7.3, and 9.3 Advanced Energy Design Guide for Small Office Buildings (30%) ASHRAE

5.3, 6.3, 7.3, and 9.3 Advanced Energy Design Guide for Small Retail Buildings (30%) ASHRAE

**INFORMATIVE APPENDIX F
ADDENDA DESCRIPTION INFORMATION**

Informative Appendix F of ASHRAE Standard 90.1-2004 is included as part of this code.

**INFORMATIVE APPENDIX G
PERFORMANCE RATING METHOD**

See Section 11 of this code.