

Chapter 1's  
and  
IECC Building Envelopes

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# SC Law Chapter 1 for Building Codes

- **SECTION 6-9-50.** Adoption by reference of nationally recognized codes and standards; outdoor burning exception.

(A) The council shall adopt by reference and amend only the latest editions of the following nationally recognized codes and the standards referenced in those codes for regulation of construction within this State: building, residential, gas, plumbing, mechanical, fire, and energy codes as promulgated, published, or made available by the International Code Council, Inc. and the National Electrical Code as published by the National Fire Protection Association. The appendices of the codes provided in this section may be adopted as needed, but the specific appendix or appendices must be referenced by name or letter designation at the time of adoption. **However, the provisions of the codes referenced in this section which concern the qualification, removal, dismissal, duties, responsibilities of, and administrative procedures for all building officials, deputy building officials, chief inspectors, other inspectors, and assistants do not apply unless they have been adopted by the municipal or county governing body**

# Title 6 Chapter 10 2009 IECC

- **SECTION 6-10-30.** Energy standard adoption; compliance.

The 2009 edition of the International Energy Conservation Code is adopted as the Energy Standard. All new and renovated buildings and additions constructed within the State must comply with this standard.

eff January 1, 2013.

**SECTION 6-10-35.** Wood-burning fireplace requirements.

Notwithstanding Section 402.4.3 of the 2009 Edition of the International Energy Conservation Code, new wood-burning fireplaces shall have tight-fitting flue dampers and outdoor combustion air.

HISTORY: 2013 Act No. 65, Section 2, eff June 14, 2013.

# Violations for IECC

- **SECTION 6-10-90. Penalties.**

(A) When a violation of the provisions of this chapter is discovered, the person in violation must be granted thirty days to correct the violation. **A person who fails to correct a violation is guilty of a misdemeanor and, upon conviction, must be fined not more than two hundred dollars or imprisoned for not more than thirty days for each offense.**

(B) A separate violation is deemed to have occurred with respect to each building not in compliance with this chapter. Each day the violation continues constitutes a separate violation.

# Violations for Building Codes

(B) A person found to be in violation of a building code or regulation adopted pursuant to the provisions of this chapter must be cited and **fined, by civil fine, in an amount not more than two hundred dollars**. Before being charged with a second violation, the person must be given seven calendar days to remedy the violation or submit a plan for correcting the violation.

# **International Energy Conservation Code 2009 Chapter 1 - Administration**

- **PART 1—SCOPE AND APPLICATION**
- **SECTION 101 SCOPE AND GENERAL REQUIREMENTS**
- **SECTION 102 ALTERNATE MATERIALS-METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS**
- **PART 2—ADMINISTRATION AND ENFORCEMENT**
- **SECTION 103 CONSTRUCTION DOCUMENTS**
- **SECTION 104 INSPECTIONS**
- **SECTION 105 VALIDITY**
- **SECTION 106 REFERENCED STANDARDS**
- **SECTION 107 FEES**
- **SECTION 108 STOP WORK ORDER**
- **SECTION 109 BOARD OF APPEALS**

# 2009 IECC

- **101.2 Scope.** This code applies to *residential and commercial buildings*.
- **101.4 Applicability.** Where there is a conflict between a general requirement and a specific requirement, **the specific requirement shall govern**
- **101.4.1 Existing buildings.** Code not designed to eliminate the use of existing buildings
- **101.4.2 Historic buildings** are exempt from this code

### **101.4.3 Additions, alterations, renovations or repairs.**

shall conform to the provisions of this code as they relate to new

#### **Exceptions:**

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.



5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. **Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.**

6. 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,**

7. Alterations that replace less than 50 percent of the luminaires in a space, **provided that such alterations do not increase the installed interior lighting power.**

8. Alterations that replace only the bulb and ballast within the existing luminaires in a space **provided that the *alteration* does not increase the installed interior lighting power.**

# SECTION 102 ALTERNATE MATERIALS

- **102.1.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein
- **102.1.1 Above code programs.** Can be allowed however, **the requirements identified as "mandatory" in Chapters 4 and 5 of this code, as applicable, shall be met**

# SECTION 103 CONSTRUCTION DOCUMENTS

**103.1 General.** Plans shall be prepared by a registered design professional where required by the statutes

## **103.2 Information on construction documents**

- insulation materials and their *R*-values
- fenestration *U*-factors and SHGCs
- area-weighted *U*-factor and SHGC calculations
- mechanical system design criteria
- mechanical and service water heating system and equipment types, sizes and efficiencies
- economizer description
- equipment and systems controls
- fan motor horsepower (hp) and controls
- duct sealing, duct and pipe insulation and location
- lighting fixture schedule with wattage and control narrative
- air sealing details

# SECTION 104 INSPECTIONS

**104.2 Required approvals** Work shall not be covered or concealed until authorized by the *code official*.

**104.6 Inspection requests** The holder of the permit

- notify the *code official* when work is ready for inspection
- to provide access to and means for inspections of such work.

# SECTION 106 REFERENCED STANDARDS

- **106.1 General.** The codes and standards referenced **in Chapter 6**
- **106.2 Conflicting requirements** the provisions of **this code shall take precedence**
- **106.4 Other laws.** **shall not nullify** any provisions of local, state or federal law

# **Chapter 3 - General Requirements**

**– SECTION 301 CLIMATE ZONES**

**– SECTION 302 DESIGN CONDITIONS**

**– SECTION 303 MATERIALS, SYSTEMS AND  
EQUIPMENT**

# SECTION 303 MATERIALS, SYSTEMS AND EQUIPMENT

- Materials, systems and equipment must be identifiable
- 303.1.1 R- Value visible
- 303.1.1.1- Blown or sprayed roof (cellulose or fiberglass) ceiling marked every 300 sq ft
- Sprayed polyurethane foam (SPF) listed on certificate and visibly posted on site with R-value and thickness installed



### 303.1.3 Fenestration product rating.

- *U*-factors labeled and certified by the manufacturer.
- Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table 303.1.3(1) or 303.1.3(2).

**TABLE 303.1.3(1) DEFAULT GLAZED FENESTRATION *U*-FACTOR**

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

**TABLE 303.1.3(2) DEFAULT DOOR U-FACTORS**

<b>DOOR TYPE</b>	<b>U-FACTOR</b>
Uninsulated Metal	1.20
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

**TABLE 303.1.3(3) DEFAULT GLAZED FENESTRATION SHGC**

<b>SINGLE GLAZED</b>		<b>DOUBLE GLAZED</b>		<b>GLAZED BLOCK</b>
<b>Clear</b>	<b>Tinted</b>	<b>Clear</b>	<b>Tinted</b>	
0.8	0.7	0.7	0.6	0.6

**303.2 Installation.** All materials, systems and equipment shall be installed in accordance with the manufacturer's installation instructions and the *International Building Code*.

**303.3 Maintenance information.** Maintenance instructions

- furnished for equipment and systems that require preventive maintenance
- clearly stated and incorporated on a readily accessible label

# REMEMBER

The requirements identified as "mandatory" in Chapters 4 and 5 of this code, as applicable, shall be met.

# **Chapter 4 - Residential Energy Efficiency**

## **401.1 Scope.**

This chapter applies to residential buildings.

## **401.2 Compliance.**

## **401.3 Certificate.**

# 401.2 Compliance.

Projects shall comply with  
The Mandatory Sections

(Building Envelope) 401, 402.4, 402.5,  
(Systems) 403.1, 403.2.2, 403.2.3, and 403.3  
through 403.9

And Either:

1. (Prescriptive); Sections  
402.1 through 402.3, 403.2.1 and 404.1

OR

2. (Performance) Section 405 .

# 401.3 Certificate. Located at electrical panel, includes Table 402.1.1 in red

Feature	2009 IECC	Comments
Table 402.1.1		
Window U Factor	0.50/ Impact Windows 0.65	
Skylight U Factor	0.65	
Window SHGC	0.30	
Ceiling R-value	30	
Wood frame R-value	13	
Mass wall R-value	5/8	
Floor R-value	19	
Basement wall R-value	5/ 13	
Slab R-value	0	
Crawl Space wall R-value	5/13	
Section 403 SYSTEMS		
Heat Pump – adaptive recovery	Yes	
Programmable Thermostat	Yes	
Duct Insulation	R-8 Attic / R-6 Outside	
Duct Sealing – Rough In test	Not in Thermal Envelope 6 cfm/100 SF 4 cfm/100 SF w/o Air Handler Installed	
Duct Sealing – Final test	Not in Thermal Envelope 8 cfm / 100 SF – leakage or 12 cfm / 100 SF – total leakage	
403.3 Piping Insulation	R-3 > 105	
403.4 Circulating HW Systems	R-2	
404.1 Lighting equipment	50% high efficacy	
403.6 Equipment sizing (Man J & D)	Required	
Section 402 Air Leakage		
402.4.3 Fireplaces	Tight Fitting Flue	
402.4.2 Building Thermal Envelope	Prescriptive Inspection or BD Testing < 7 ACH	

# SECTION 402 BUILDING THERMAL ENVELOPE

402.1 General (Prescriptive).

402.2 Specific insulation requirements (Prescriptive).

402.3 Fenestration. (Prescriptive).

**402.4 Air leakage (Mandatory).**

402.5 Maximum fenestration U-factor and SHGC (Mandatory).



## 402.4 Air leakage (**Mandatory**).

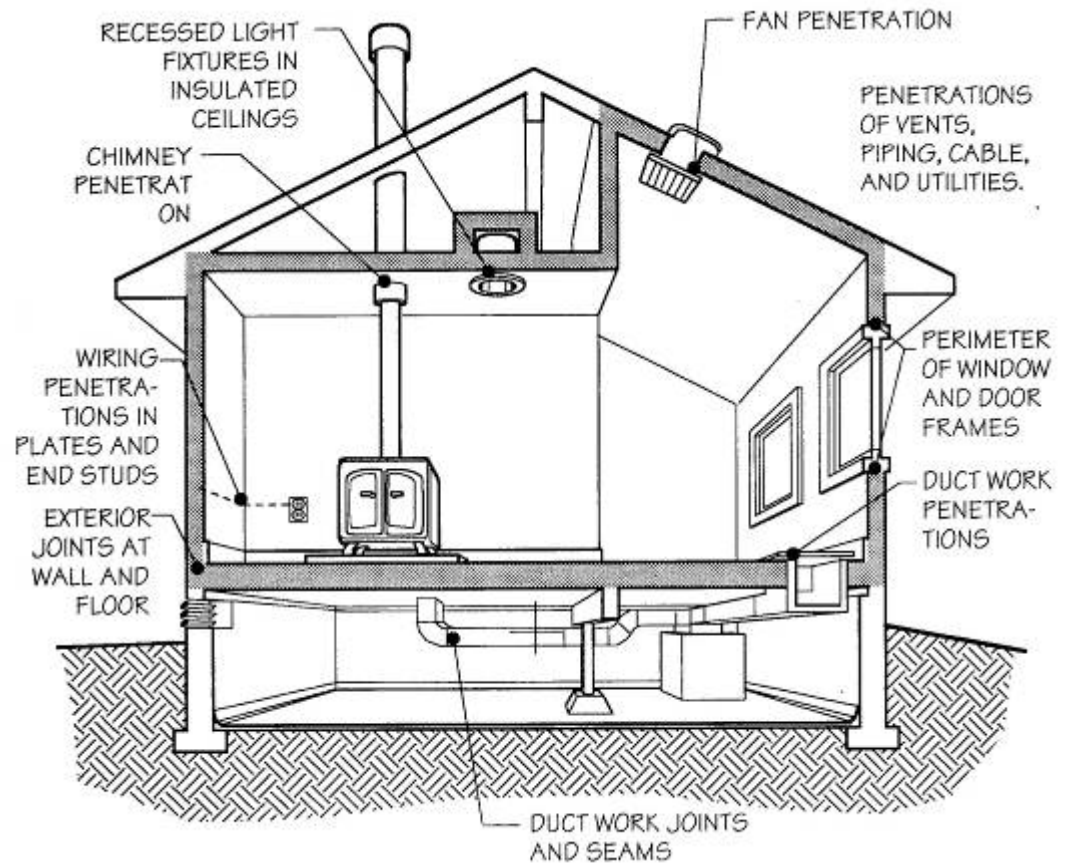
**402.4.1 Building thermal envelope.** The *building thermal envelope*

- Shall be durably sealed to limit infiltration
- Dissimilar materials to allow for differential expansion and contraction.

**The following shall be caulked, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.**

# Areas for Air Leakage (Infiltration)

- Windows and doors
- Between sole plates
- Floors and exterior wall panels
- Plumbing
- Electrical
- Service access doors or hatches
- Recessed light fixtures



- 1. All joints, seams and penetrations.**
- 2. Site-built windows, doors and skylights.**
- 3. Openings between window and door assemblies and their respective jambs and framing.**
- 4. Utility penetrations.**
- 5. Dropped ceilings or chases adjacent to the thermal envelope.**

- 6. Knee walls.**
- 7. Walls and ceilings separating a garage from conditioned spaces.**
- 8. Behind tubs and showers on exterior walls.**
- 9. Common walls between dwelling units.**
- 10. Attic access openings.**
- 11. Rim joist junction.**
- 12. Other sources of infiltration.**

**402.4.2 Air sealing and insulation.** Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.4.2.1(blower door) or 402.4.2.2(visual):

**TABLE 402.4.2 AIR BARRIER AND INSULATION  
INSPECTION COMPONENT CRITERIA  
(see next slide)**

COMPONENT	CRITERIA
Air barrier and thermal barrier	<p>Exterior thermal envelope insulation for framed walls is installed in substantial contact and continuous alignment with building envelope air barrier.</p> <p>Breaks or joints in the air barrier are filled or repaired.</p> <p>Air-permeable insulation is not used as a sealing material.</p> <p>Air-permeable insulation is inside of an air barrier.</p>
Ceiling/attic	<p>Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.</p> <p>Attic access (except unvented attic), knee wall door, or drop down stair is sealed.</p>
Walls	<p>Corners and headers are insulated.</p> <p>Junction of foundation and sill plate is sealed.</p>
Windows and doors	<p>Space between window/door jambs and framing is sealed.</p>
Rim joists	<p>Rim joists are insulated and include an air barrier.</p>
Floors (including above-garage and cantilevered floors)	<p>Insulation is installed to maintain permanent contact with underside of subfloor decking.</p> <p>Air barrier is installed at any exposed edge of insulation.</p>
Crawl space walls	<p>Insulation is permanently attached to walls.</p> <p>Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints taped.</p>
Shafts, penetrations	<p>Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned space are sealed.</p>

Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.
Garage separation	Air sealing is provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures are air tight, IC rated, and sealed to drywall. Exception-fixtures in conditioned space.
Plumbing and wiring	Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation and an air barrier separating them from the exterior wall.
Electrical/phone box on exterior walls	Air barrier extends behind boxes or air sealed-type boxes are installed.
Common wall	Air barrier is installed in common wall between dwelling units.
HVAC register boots	HVAC register boots that penetrate building envelope are sealed to subfloor or drywall.
Fireplace	Fireplace walls include an air barrier.

- **402.4.2.1 Testing option.** Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is **less than seven air changes per hour (ACH) when tested with a blower door at a pressure of 33.5 psf (50 Pa)**. Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;
2. Dampers shall be closed, but not sealed, including exhaust, intake, makeup air, backdraft and flue dampers;
3. Interior doors shall be open;
4. Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling system(s) shall be turned off;
6. HVAC ducts shall not be sealed; and
7. Supply and return registers shall not be sealed.



**402.4.2.2 Visual inspection option.** acceptable when the items listed in **Table 402.4.2, applicable to the method of construction, are field verified.** Where required by the *code official*, an *approved* party independent from the installer of the insulation shall inspect the air barrier and insulation.

**402.4.3 Fireplaces.** **New wood-burning fireplaces shall have tight fitting flue according to SC Law change.**

**402.4.4 Fenestration air leakage.** Windows, skylights and sliding glass doors shall have an air infiltration rate of no more than 0.3 cfm per square foot (1.5 L/s/m<sup>2</sup>), and swinging doors no more than 0.5 cfm per square foot (2.6 L/s/m<sup>2</sup>), when tested according to NFRC 400 or AAMA/WDMA/CSA 101/I.S. 2/A440 by an accredited, independent laboratory and *listed* and *labeled* by the manufacturer.

**Exceptions:** Site-built windows, skylights and doors

- **402.4.5 Recessed lighting.** Recessed luminaires installed in the *building thermal envelope* shall be sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be IC-rated and labeled as meeting ASTM E 283 when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the ceiling cavity. All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering. **Typically “IC-AT” RATED fixture**

## **402.5 Maximum fenestration *U*-factor and SHGC (Mandatory).**

The area-weighted average maximum fenestration SHGC permitted using trade-offs from Section 405 in Zones 1 through 3 shall be **0.50**.

# **SECTION 405 SIMULATED PERFORMANCE ALTERNATIVE (Performance)**

**405.1 Scope.**

**405.2 Mandatory requirements.**

**405.3 Performance-based compliance.**

**405.4 Documentation.**

**405.5 Calculation procedure.**

**405.6 Calculation software tools.**

# Chapter 5

## Commercial Energy Efficiency

- SECTION 501-GENERAL
- SECTION 502- BUILDING ENVELOPE REQUIREMENTS {502.4(Mandatory)}
- SECTION 503 - BUILDING MECHANICAL SYSTEMS
- SECTION 504 -SERVICE WATER HEATING (Mandatory)
- SECTION 505 - ELECTRICAL POWER AND LIGHTING SYSTEMS (Mandatory)
- SECTION 506 -TOTAL BUILDING PERFORMANCE

# SECTION 501 GENERAL

- **501.1 Scope.** The requirements contained in this chapter are applicable to **commercial buildings, or portions of commercial buildings** shall meet either the requirements of **ANSI/ASHRAE/IESNA Standard 90.1, *Energy Standard for Buildings Except for Low-Rise Residential Buildings*, or** the requirements contained in this chapter.

**501.2 Application.** *The commercial building project shall comply with the requirements in Sections 502 (Building envelope requirements), 503 (Building mechanical systems), 504 (Service water heating) and 505 (Electrical power and lighting systems) in its entirety. As an alternative the commercial building project shall comply with the requirements of ANSI/ASHRAE/IESNA 90.1 in its entirety.*

**Exception:** Buildings conforming to **Section 506**, provided the **Mandatory Sections 502.4, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7** are each satisfied.

Please note Section 506 is Building Performance based design and these above Sections are the **MANDATORY SECTIONS** for commercial buildings.

# 502.4 Air leakage (Mandatory).

**502.4.1 Window and door assemblies.** The air leakage of window and sliding or swinging door assemblies that are part of the building envelope shall be determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, or NFRC 400 by an accredited, independent laboratory, and *labeled* and certified by the manufacturer and shall not exceed the values in Section 402.4.2. (I believe this should be **502.4.2**)

**Exception:** Site-constructed windows and doors that are weatherstripped or sealed in accordance with **Section 502.4.3.**

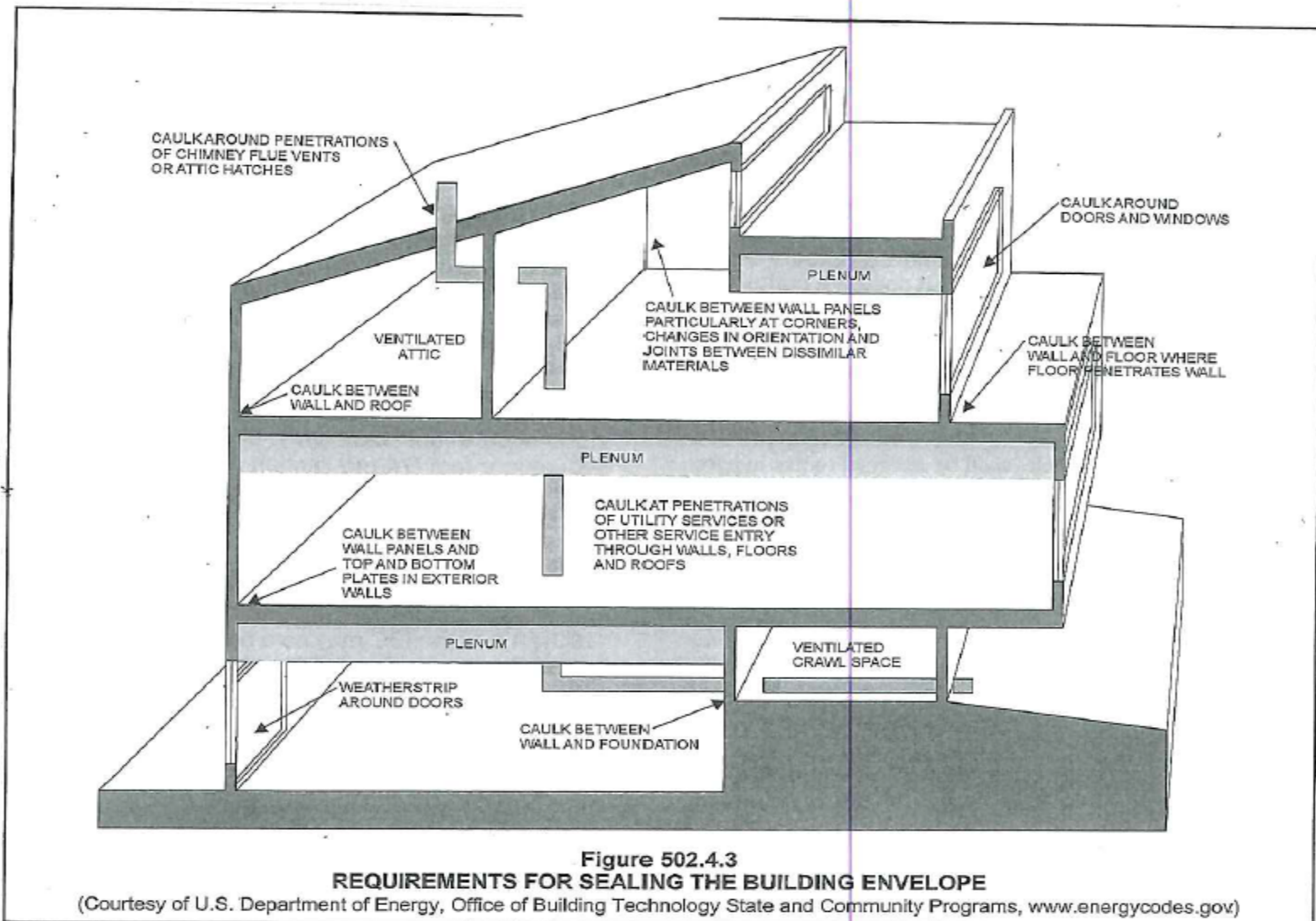


## 502.4.2 Curtain wall, storefront glazing and commercial entrance doors.

Curtain wall, *storefront* glazing and commercial-glazed swinging entrance doors and revolving doors shall be tested for air leakage at 1.57 pounds per square foot (psf) (75 Pa) in accordance with ASTM E 283. For **curtain walls and storefront glazing**, the maximum air leakage rate shall be 0.3 cubic foot per minute per square foot (cfm/ft<sup>2</sup>) (5.5 m<sup>3</sup>/h × m<sup>2</sup>) of **fenestration area**. For **commercial glazed swinging entrance doors and revolving doors**, the maximum air leakage rate shall be 1.00 cfm/ft<sup>2</sup> (18.3 m<sup>3</sup>/h × m<sup>2</sup>) **of door area** when tested in accordance with ASTM E 283.

## 502.4.3 Sealing of the building envelope.

**Openings and penetrations** in the building envelope **shall be sealed** with caulking materials or closed with gasketing systems compatible with the construction materials and location. **Joints and seams shall be sealed** in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials spanning joints between construction **materials shall allow for expansion** and contraction of the construction materials.



## 502.4.5 Outdoor air intakes and exhaust openings.

Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be equipped with **not less than a Class I motorized, leakage-rated damper with a maximum leakage rate of 4 cfm per square foot** (6.8 L/s · C m<sup>2</sup>) at 1.0 inch water gauge (w.g.) (1250 Pa) when tested in accordance with AMCA 500D.

**Exception:** Gravity (nonmotorized) dampers are permitted to be used in buildings less than three stories in height above grade

**502.4.6 Loading dock weather-seals.** Cargo doors and loading dock doors shall be **equipped with weather-seals** to restrict infiltration when vehicles are parked in the doorway.

**502.4.7 Vestibules.** A door that separates *conditioned space* from the exterior shall be **protected with an enclosed vestibule**, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

**Exceptions:**

1. Buildings in climate Zones 1 and 2 as indicated in Figure 301.1 and Table 301.1.
2. Doors not intended to be used as a building *entrance door*, such as doors to mechanical or electrical equipment rooms.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that **open directly from a space less than 3,000 square feet** (298 m<sup>2</sup>) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

## 502.4.8 Recessed lighting.

Recessed luminaires installed in the *building thermal envelope* shall be sealed to **limit air leakage between conditioned and unconditioned spaces**. All recessed luminaires shall be **IC-rated and labeled as meeting ASTM E 283** when tested at 1.57 psf (75 Pa) pressure differential with no more than 2.0 cfm (0.944 L/s) of air movement from the *conditioned space* to the ceiling cavity. All **recessed luminaires shall be sealed with a gasket or caulk** between the housing and interior wall or ceiling covering.

# SECTION 506 TOTAL BUILDING PERFORMANCE

506.1 Scope.

506.2 Mandatory requirements.

506.3 Performance-based compliance.

506.4 Documentation.

506.5 Calculation procedure.

506.6 Calculation software tools.

# Acceptable forms for alternative methods

- COMcheck
- REScheck
- ASHRAE 90.1
- HEERS
- LEEDS
- Others, submit for approval to AHJ



**Are there any questions or  
comments?**

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