

2024



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INTERNATIONAL **ENERGY**
CONSERVATION CODE[®]



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2024 International Energy Conservation Code®

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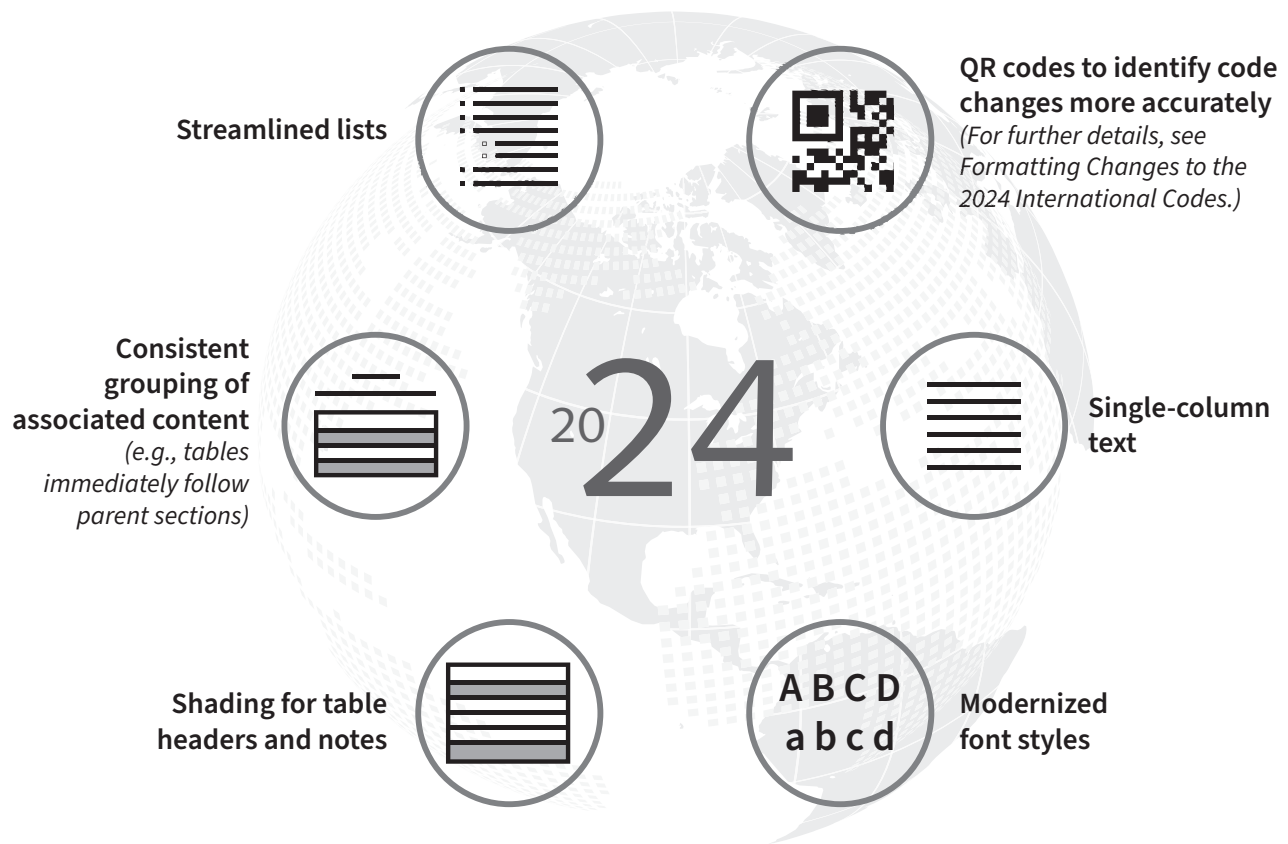
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NEW DESIGN FOR THE 2024 INTERNATIONAL CODES



The 2024 International Codes® (I-Codes®) have undergone substantial formatting changes as part of the digital transformation strategy of the International Code Council® (ICC®) to improve the user experience. The resulting product better aligns the print and PDF versions of the I-Codes with the ICC's Digital Codes® content.

The changes, promoting a cleaner, more modern look and enhancing readability and sustainability, include:



More information can be found at iccsafe.org/design-updates.



PREFACE

FORMATTING CHANGES TO THE 2024 INTERNATIONAL CODES

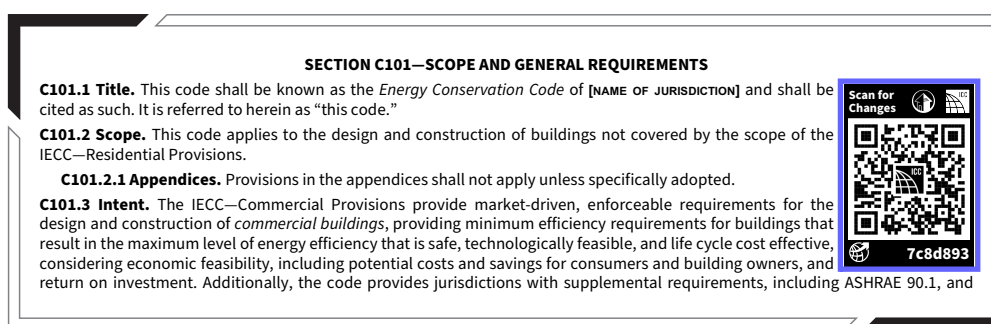
The 2024 International Codes® (I-Codes®) have undergone substantial formatting changes as part of the digital transformation strategy of the International Code Council® (ICC®) to improve the user experience. The resulting product better aligns the print and PDF versions of the I-Codes with the ICC's Digital Codes content. Additional information can be found at iccsafe.org/design-updates.

Replacement of Marginal Markings with QR Codes

Through 2021, print editions of the I-Codes identified technical changes from prior code cycles with marginal markings [solid vertical lines for new text, deletion arrows (➡), asterisks for relocations (*)]. The 2024 I-Code print editions replace the marginal markings with QR codes to identify code changes more precisely.

A QR code is placed at the beginning of any section that has undergone technical revision. If there is no QR code, there are no technical changes to that section.

In the following example from the 2024 *International Energy Conservation Code*® (IECC®), a QR code indicates there are changes to Section C101 from the 2021 IECC. Note that the change may occur in the main section or in one or more subsections of the main section.



To see the code changes, the user need only scan the QR code with a smart device. If scanning a QR code is not an option, changes can be accessed by entering the 7-digit code beneath the QR code at the end of the following URL: qr.iccsafe.org/ (in the above example, "qr.iccsafe.org/7c8d893"). Those viewing the code book via PDF can click on the QR code.

All methods take the user to the appropriate section on ICC's Digital Codes website, where technical changes from the prior cycle can be viewed. Digital Codes Premium subscribers who are logged in will be automatically directed to the Premium view. All other users will be directed to the Digital Codes Basic free view. Both views show new code language in blue text along with deletion arrows for deleted text and relocation markers for relocated text.

Digital Codes Premium offers additional ways to enhance code compliance research, including revision histories, commentary by code experts and an advanced search function. A full list of features can be found at codes.iccsafe.org/premium-features.

ABOUT THE I-CODES

The 2024 I-Codes, published by the ICC, are 15 fully compatible titles intended to establish provisions that adequately protect public health, safety and welfare; that do not unnecessarily increase construction costs; that do not restrict the use of new materials, products or methods of construction; and that do not give preferential treatment to particular types or classes of materials, products or methods of construction.

The I-Codes are updated on a 3-year cycle to allow for new construction methods and technologies to be incorporated into the codes. Alternative materials, designs and methods not specifically addressed in the I-Code can be approved by the building official where the proposed materials, designs or methods comply with the intent of the provisions of the code.

The I-Codes are used as the basis of laws and regulations in communities across the US and in other countries. They are also used in a variety of nonregulatory settings, including:

- Voluntary compliance programs.
- The insurance industry.
- Certification and credentialing for building design, construction and safety professionals.
- Certification of building and construction-related products.
- Facilities management.
- "Best practices" benchmarks for designers and builders.
- College, university and professional school textbooks and curricula.
- Reference works related to building design and construction.

Code Development Process

The code development process regularly provides an international forum for building professionals to discuss requirements for building design, construction methods, safety, performance, technological advances and new products. Proposed changes to the I-Codes, submitted by code enforcement officials, industry representatives, design professionals and other interested parties, are deliberated through an open code development process in which all interested and affected parties may participate.

Openness, transparency, balance, due process and consensus are the guiding principles of both the ICC Code Development Process and OMB Circular A-119, which governs the federal government’s use of private-sector standards. The ICC process is open to anyone without cost. Remote participation is available through cdpAccess®, the ICC’s cloud-based app.

In order to ensure that organizations with a direct and material interest in the codes have a voice in the process, the ICC has developed partnerships with key industry segments that support the ICC’s important public safety mission. Some code development committee members were nominated by the following industry partners and approved by the ICC Board:

- American Gas Association (AGA)
- American Institute of Architects (AIA)
- American Society of Plumbing Engineers (ASPE)
- International Association of Fire Chiefs (IAFC)
- National Association of Home Builders (NAHB)
- National Association of State Fire Marshals (NASFM)
- National Council of Structural Engineers Association (NCSEA)
- National Multifamily Housing Council (NMHC)
- Plumbing Heating and Cooling Contractors (PHCC)
- Pool and Hot Tub Alliance (PHTA), formerly The Association of Pool and Spa Professionals (APSP)

Code development committees evaluate and make recommendations regarding proposed changes to the codes. Their recommendations are then subject to public comment and council-wide votes. The ICC’s governmental members—public safety officials who have no financial or business interest in the outcome—cast the final votes on proposed changes.

The I-Codes are subject to change through future code development cycles and by any governmental entity that enacts the code into law. For more information regarding the code development process, contact the Codes and Standards Development Department of the ICC at iccsafe.org/products-and-services/i-codes/code-development/.

While the I-Code development procedure is thorough and comprehensive, the ICC, its members and those participating in the development of the codes expressly disclaim any liability resulting from the publication or use of the I-Codes, or from compliance or noncompliance with their provisions. NO WARRANTY OF ANY KIND, IMPLIED, EXPRESSED OR STATUTORY, IS GIVEN WITH RESPECT TO THE I-CODES. The ICC does not have the power or authority to police or enforce compliance with the contents of the I-Codes.

Coordination of the I-Codes

The coordination of technical provisions allows the I-Codes to be used as a complete set of complementary documents. Individual codes can also be used in subsets or as stand-alone documents. Some technical provisions that are relevant to more than one subject area are duplicated in multiple model codes.

Italicized Terms

Words and terms defined in Chapter 2, Definitions, are italicized where they appear in code text and the Chapter 2 definitions apply. Although care has been taken to ensure applicable terms are italicized, there may be instances where a defined term has not been italicized or where a term is italicized but the definition found in Chapter 2 is not applicable. For example, Chapter 2 of the *International Building Code*® (IBC) contains a definition for “*Listed*” that is applicable to equipment, products and services. The term “*listed*” is also used in that code to refer to a list of items within the code or within a referenced document. For the latter, the Chapter 2 definition would not be applicable.

Adoption of International Code Council Codes and Standards

The International Code Council maintains a copyright in all of its codes and standards. Maintaining copyright allows the Code Council to fund its mission through sales of books in both print and digital format. The Code Council welcomes incorporation by reference of its codes and standards by jurisdictions that recognize and acknowledge the Code Council’s copyright in the codes and standards, and further acknowledge the substantial shared value of the public/private partnership for code development between jurisdictions and the Code Council. By making its codes and standards available for incorporation by reference, the Code Council does not waive its copyright in its codes and standards.

The Code Council’s codes and standards may only be adopted by incorporation by reference in an ordinance passed by the governing body of the jurisdiction. “Incorporation by reference” means that in the adopting ordinance, the governing body cites only the title, edition, relevant sections or subsections (where applicable), and publishing information of the model code or standard, and the actual text of the model code or standard is not included in the ordinance (see graphic, “Adoption of International Code Council

Codes and Standards”). The Code Council does not consent to the reproduction of the text of its codes or standards in any ordinance. If the governing body enacts any changes, only the text of those changes or amendments may be included in the ordinance.



The Code Council also recognizes the need for jurisdictions to make laws accessible to the public. Accordingly, all I-Codes and I-Standards, along with the laws of many jurisdictions, are available to view for free at codes.iccsafe.org/codes/i-codes. These documents may also be purchased, in both digital and print versions, at shop.iccsafe.org.

To facilitate adoption, some I-Code sections contain blanks for fill-in information that needs to be supplied by the adopting jurisdiction as part of the adoption legislation. For example, the IECC contains:

Section C101.1. Insert: **[NAME OF JURISDICTION]**

Section R101.1. Insert: **[NAME OF JURISDICTION]**

For further information or assistance with adoption, including a sample ordinance, jurisdictions should contact the Code Council at incorporation@iccsafe.org.

For a list of frequently asked questions (FAQs) addressing a range of foundational topics about the adoption of model codes by jurisdictions and to learn more about the Code Council’s code adoption resources, scan the QR code or visit iccsafe.org/code-adoption-resources.



INTRODUCTION TO THE INTERNATIONAL ENERGY CONSERVATION CODE

The standards development process regularly provides an international forum for building professionals to discuss requirements for building design, construction methods, safety, performance, technological advances and new products. Proposed changes to the I-Codes developed through ICC Standards Consensus Procedures, submitted by code enforcement officials, industry representatives, design professionals and other interested parties, are deliberated through an open standards development process in which all interested and affected parties may participate.

Openness, transparency, balance, due process and consensus are the guiding principles of both the ICC Codes and Standards Development Processes and OMB Circular A-119, which governs the federal government's use of private-sector standards. The ICC process is open to anyone without cost. Remote participation is available through cdpAccess®, the ICC's cloud-based app.

In order to ensure that organizations with a direct and material interest in the codes have a voice in the process, the ICC has encouraged participation of key industry segments that support the ICC's important public safety mission.

Code development committees, using the Standards Consensus Procedures, evaluate proposed changes to the codes. After public comments are reviewed, the committee members vote to approve changes.

ARRANGEMENT AND FORMAT OF THE 2024 IECC

The IECC contains two separate sets of provisions—one for commercial buildings and one for residential buildings. Each set of provisions is applied separately to buildings within their scope. The IECC—Commercial Provisions apply to all buildings except for residential buildings three stories or less in height. The IECC—Residential Provisions apply to detached one- and two-family dwellings and multiple single-family dwellings as well as Group R-2, R-3 and R-4 buildings three stories or less in height. These scopes are based on the definitions of “Commercial building” and “Residential building,” respectively, in Chapter 2 of each set of provisions. Note that the IECC—Commercial Provisions therefore contain provisions for residential buildings four stories or greater in height.

The following table shows how the IECC is divided. The chapter synopses detail the scope and intent of the provisions of the IECC.

CHAPTER TOPICS	
Chapter	Subjects
1 and 2	Administration and definitions
3	Climate zones and general materials requirements
4	Energy efficiency requirements
5	Existing buildings
6	Referenced standards
Appendices CA/RA	Board of appeals
Appendices CB/RB	Solar-ready zone
Appendices CC/RC	Zero energy building provisions
Appendix CD	The 2030 glide path
Appendix CE	Required HVAC total system performance ratio (TSPR)
Appendix CF	Energy credits
Appendices CG/RE	Electric vehicle charging infrastructure
Appendices CH/RK	Electric-ready building provisions
Appendices CI/RJ	Demand responsive controls
Appendices CJ/RD	Electric energy storage provisions
Appendix RF	Alternative building thermal envelope insulation R-value options
Appendix RG	2024 IECC stretch code
Appendix RH	Operational carbon rating and energy reporting
Appendix RI	On-site renewable energy
Appendix RL	Renewable energy infrastructure

Chapter 1 Scope and Administration.

Chapters 1 [CE] and 1 [RE] establish the limits of applicability of the code and describe how the code is to be applied and enforced. The provisions of Chapter 1 establish the authority and duties of the code official appointed by the authority having jurisdiction and also establish the rights and privileges of the design professional, contractor and property owner.

Chapter 2 Definitions.

Chapters 2 [CE] and 2 [RE] are the repository of the definitions of terms used in the body of the code. The user of the code should be familiar with and consult these chapters because the definitions are essential to the correct interpretation of the code and because the user may not be aware that a term is defined.

Chapter 3 General Requirements.

Chapters 3 [CE] and 3 [RE] specify the climate zones that will serve to establish the exterior design conditions. In addition, Chapter 3 provides interior design conditions that are used as a basis for assumptions in heating and cooling load calculations, and provides basic material requirements for insulation materials and fenestration materials. Climate has a major impact on the energy use of most buildings. The code establishes many requirements such as wall and roof insulation *R*-values, window and door thermal transmittance (*U*-factors) and provisions that affect the mechanical systems based on the climate where the building is located. This chapter contains information that will be used to properly assign the building location into the correct climate zone and is used as the basis for establishing or eliminating requirements.

Chapter 4 Energy Efficiency.

Chapter 4 [CE] contains the energy-efficiency-related requirements for the design and construction of most types of commercial buildings and residential buildings greater than three stories in height above grade. This chapter defines requirements for the portions of the building and building systems that impact energy use in new commercial construction and new residential construction greater than three stories in height, and promotes the effective use of energy. In addition to energy conservation requirements for the building envelope, this chapter contains requirements that impact energy efficiency for the HVAC systems, the electrical systems and the plumbing systems. It should be noted, however, that requirements are contained in other codes that have an impact on energy conservation. For instance, requirements for water flow rates are regulated by the *International Plumbing Code*.

Chapter 4 [RE] contains the energy-efficiency-related requirements for the design and construction of residential buildings regulated under this code. It should be noted that the definition of a residential building in this code is unique for this code. In this code, residential buildings include detached one- and two-family dwellings and multiple single-family dwellings as well as R-2, R-3 or R-4 buildings three stories or less in height. All other buildings, including residential buildings greater than three stories in height, are regulated by the energy conservation requirements in the IECC—Commercial Provisions. The applicable portions of a residential building must comply with the provisions within this chapter for energy efficiency. This chapter defines requirements for the portions of the building and building systems that impact energy use in new residential construction and promotes the effective use of energy. The provisions within the chapter promote energy efficiency in the building envelope, the heating and cooling system and the service water-heating system of the building.

Chapter 5 Existing Buildings.

Chapters 5 [CE] and 5 [RE] contain the technical energy efficiency requirements for existing buildings. Chapter 5 provisions address the maintenance of buildings in compliance with the code as well as how additions, alterations, repairs and changes of occupancy need to be addressed from the standpoint of energy efficiency. Specific provisions are provided for historic buildings.

Chapter 6 Referenced Standards.

Chapters 6 [CE] and 6 [RE] list all of the product and installation standards and codes that are referenced throughout Chapters 1 through 5 and include identification of the promulgators and the section numbers in which the standards and codes are referenced. As stated in Sections C102.4 and R102.4, these standards and codes become an enforceable part of the code (to the prescribed extent of the reference) as if printed in the body of the code.

Appendices.

The appendices, while not part of the code, can become part of the code when specifically included in the adopting ordinance.

Chapter 1 requires the establishment of a board of appeals to hear appeals regarding determinations made by the code official.

Appendices CA and RA provide qualification standards for members of the board as well as operational procedures of such board.

Appendices CB, RB and RL address provisions for solar capacity in new structures.

Appendices CC and RC provide requirements intended bring about net zero annual energy consumption in their respective structures.

Appendix CD provides adopting jurisdictions a compliance path toward zero net energy construction by the 2030 adoption cycle.

Appendix CE provides a stretch code through HVAC incentives to Section C403.

Appendix CF provides advanced energy credit package requirements to improve efficiency requirements in Section C406.

Appendices CG and RE provide guidance for an authority having jurisdiction wishing to provide electric vehicle readiness provisions.

Appendices CH and RK provide guidance on how to prepare commercial and residential buildings to be electric ready.

Appendices CI and RJ provide guidance for demand responsive controls for building appliances and systems.

Appendices CJ and RD provide requirements for electric energy storage readiness provisions.

The purpose of Appendix RF is to provide expanded *R*-value options for determining compliance with the *U*-factor criteria in Section R402.

Similar to Appendix CD, Appendix RG provides requirements for residential buildings intended to lower energy consumption beyond the requirements of the 2024 IECC.

Appendix RH provides a means to evaluate a building's greenhouse gas performance in accordance with ANSI/RESNET/ICC 301.

Appendix RI describes requirements for prescriptive solar PV to be installed at the time of construction.

RELOCATION OF TEXT OR TABLES

The following tables indicate the relocation of sections and tables in the 2024 edition of the IECC from the 2021 edition.

IECC [CE] RELOCATIONS	
2024 LOCATION	2021 LOCATION
C101.4	C101.5
C101.4.1	C101.5.1
C102.1	C101.4
C102.1.1	C101.4.1
C102.2	C108.3
C102.3	C108.2
C102.4	C108.1
C102.4.1	C108.1.1
C102.4.2	C108.1.2
C102.5	C107.1
C104	C102
C104.1	C102.1
C104.1.1	C102.1.1
C105	C103
C105.1	C103.1
C105.2	C103.2
C105.2.1	C103.2.1
C105.3	C103.3
C105.3.1	C103.3.1
C105.3.2	C103.3.2
C105.3.3	C103.3
C105.4	C103.4
C105.5	C103.5
C105.6	C103.6
C105.6.1	C103.6.1
C105.6.2	C103.6.2
C105.6.3	C103.6.3
C106	C104
C106.1	C104.1
C106.2	C104.2
C106.4	C104.3
C106.5	C104.4
C106.6	C104.5
C107	C105
C107.1	C105.1
C107.2	C105.2
C107.2.1	C105.2.1

IECC [CE] RELOCATIONS—continued	
2024 LOCATION	2021 LOCATION
C107.2.2	C105.2.2
C107.2.3	C105.2.3
C107.2.4	C105.2.4
C107.2.5	C105.2.5
C107.2.6	C105.2.6
C107.3	C105.3
C107.4	C105.4
C107.5	C105.5
C107.6	C105.6
C108	C106
C108.1	C106.1
C108.2	C106.2
C109	C110
C109.1	C110.1
C109.2	C110.2
C109.3	C110.3
C110	C109
C110.1	C109.1
C110.2	C109.2
C110.3	C109.3
C110.4	C109.4
C402.1.1.2	C402.1.1.1
Table C402.1.1.2	Table C402.1.1.1
C402.1.1.3	C402.1.2
C402.1.2	C402.1.4
Table C402.1.2	Table C402.1.4
C402.1.2.1.1	C402.1.4.1.1
C402.1.2.1.2	C402.1.4.1.2
C402.1.2.1.6	C402.1.4.2
C402.1.3.3	C402.2.1.3
C402.1.4	C402.1.5
C402.1.5	C402.5.5
C402.2.1.1	C402.2.1.4
C402.2.1.2	C402.2.1.5
C402.2.4	C402.2.4.1
C402.4	C402.3
Table C402.4	Table C402.3
C402.4.1	C402.3.1
C402.5	C402.4
Table C402.5	Table C402.4
C402.5.1	C402.4.1
C402.5.1.1	C402.4.1.1
C402.5.1.2	C402.4.1.2
C402.5.2	C402.4.2
C402.5.2.1	C402.4.2.1
C402.5.2.2	C402.4.2.2

IECC [CE] RELOCATIONS—continued	
2024 LOCATION	2021 LOCATION
C402.5.3	C402.4.3
C402.5.3.1	C402.4.3.1
C402.5.3.2	C402.4.3.2
C402.5.3.3	C402.4.3.3
C402.5.3.4	C402.4.3.4
C402.5.4	C402.4.4
C402.5.5	C402.4.5
C402.5.5.1	C402.4.5.1
C402.5.5.2	C402.4.5.2
C402.6	C402.5
C402.6.1	C402.5.1
C402.6.1.2	C402.5.1.1
C402.6.1.2.1	C402.5.10
C402.6.2	C402.5.1.2
C402.6.2.1	C402.5.3
C402.6.2.2	C402.5.2
C402.6.2.3	C402.5.1.5
C402.6.2.3.1	C402.5.1.3
C402.6.2.3.2	C402.5.1.4
C402.6.3	C402.5.4
Table C402.6.3	Table C402.5.4
C402.6.4	C402.5.6
C402.6.5	C402.5.7
C402.6.6	C402.5.9
C402.6.7	C402.5.8
C403.3.4.2	C403.3.4
Table C403.3.4.2	Table C403.3.4
C403.4.1.4	C403.4.1.3
C403.4.1.5	C403.4.1.4
C403.4.1.6	C403.4.1.5
C403.4.7	C402.6.11
C403.11	C403.10
C403.11.1	C403.10.1
C403.11.2	C403.10.2
C403.11.3	C403.10.3
C403.11.4	C403.10.4
C403.11.5	C403.10.5
C403.11.6	C403.10.6
C403.12	C403.11
C403.12.1	C403.11.1
Table C403.12.1	Table C403.11.1
C403.12.2	C403.11.2
C403.12.2.1	C403.11.2.1
Table C403.12.2.1(1)	Table C403.11.2.1(1)
Table C403.12.2.1(2)	Table C403.11.2.1(2)
Table C403.12.2.1(3)	Table C403.11.2.1(3)

IECC [CE] RELOCATIONS—continued	
2024 LOCATION	2021 LOCATION
C403.12.3	C403.11.3
C403.12.3.1	C403.11.3.1
C403.12.3.2	C403.11.3.2
C403.13	C403.12
C403.13.1	C403.12.1
C403.13.2	C403.12.2
C403.13.2.1	C403.12.2.1
C403.13.2.2	C403.12.2.2
C403.13.2.3	C403.12.2.3
C403.13.3	C403.12.3
Table C403.13.3(1)	Table C403.12.3
C403.13.3.1	C403.12.3.1
C403.14	C403.13
C403.14.1	C403.13.1
C403.14.2	C403.13.2
C403.14.4	C403.13.3
C405.2.9	C405.2.8
C405.10	C405.9
C405.10.1	C405.9.1
C405.10.2	C405.9.2
C405.10.2.1	C405.9.2.1
C405.11	C405.10
C405.12	C405.11
C405.12.1	C405.11.1
C405.13	C405.12
C405.13.1	C405.12.1
C405.13.2	C405.12.2
Table C405.13.2	Table C405.12.2
C405.13.3	C405.12.3
C405.13.4	C405.12.4
C405.13.5	C405.12.5
C407.5.1.1	C407.5
C407.5.3	C407.5.2
C407.5.4	C407.5.3

IECC [RE] RELOCATIONS	
2024 LOCATION	2021 LOCATION
R101.4	R101.5
R101.4.1	R101.5.1
R102.1	R101.4
R102.1.1	R101.4.1
R102.2	R108.3
R102.3	R108.2
R102.4	R108.1

IECC [RE] RELOCATIONS—continued	
2024 LOCATION	2021 LOCATION
R102.4.1	R108.1.1
R102.4.2	R108.1.2
R102.5	R107.1
R104	R102
R104.1	R102.1
R104.1.1	R102.1.1
R105	R103
R105.1	R103.1
R105.2	R103.2
R105.2.1	R103.2.1
R105.3	R103.3
R105.3.1	R103.3.1
R105.3.2	R103.3.2
R105.3.3	R103.3.3
R105.4	R103.4
R105.5	R103.5
R106	R104
R106.1	R104.1
R106.2	R104.2
R106.4	R104.3
R106.5	R104.4
R106.6	R104.5
R107	R105
R107.1	R105.1
R107.2	R105.2
R107.2.1	R105.2.1
R107.2.2	R105.2.2
R107.2.3	R105.2.3
R107.2.4	R105.2.4
R107.2.7	R105.2.5
R107.3	R105.3
R107.4	R105.4
R107.5	R105.5
R107.6	R105.6
R108	R106
R108.1	R106.1
R108.2	R106.2
R109	R110
R109.1	R110.1
R109.2	R110.2
R109.3	R110.3
R109.4	R110.4
R110	R109
R110.1	R109.1
R110.2	R109.2
R110.3	R109.3

IECC [RE] RELOCATIONS—continued	
2024 LOCATION	2021 LOCATION
R110.4	R109.4
R402.1.6	R402.4.4
R402.2.4	R402.2.3
R402.2.5	R402.2.4
R402.2.5.1	R402.2.4.1
R402.2.6	R402.2.5
R402.2.7	R402.2.6
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ABBREVIATIONS AND NOTATIONS

The following table contains a list of common abbreviations and units of measurement used in this code. Some of the abbreviations are for terms defined in Chapter 2. Others are terms used in various tables and text of the code.

ABBREVIATIONS AND NOTATIONS	
AFUE	Annual fuel utilization efficiency
bhp	Brake horsepower (fans)
Btu	British thermal unit
Btu/h × ft ²	Btu per hour per square foot
C-factor	See Chapter 2—Definitions
CDD	Cooling degree days
cfm	Cubic feet per minute
cfm/ft ²	Cubic feet per minute per square foot
ci	Continuous insulation
COP	Coefficient of performance
DCV	Demand control ventilation
°C	Degrees Celsius
°F	Degrees Fahrenheit
DWHR	Drain water heat recovery
DX	Direct expansion
E_c	Combustion efficiency
E_v	Ventilation efficiency
E_t	Thermal efficiency
EER	Energy efficiency ratio
EF	Energy factor
ERI	Energy rating index
F-factor	See Chapter 2—Definitions
FDD	Fault detection and diagnostics
FEI	Fan energy index
FL	Full load
ft ²	Square foot
gpm	Gallons per minute
HDD	Heating degree days
hp	Horsepower

ABBREVIATIONS AND NOTATIONS—continued	
HSPF	Heating seasonal performance factor
HVAC	Heating, ventilating and air conditioning
IEER	Integrated energy efficiency ratio
IPLV	Integrated Part Load Value
Kg/m ²	Kilograms per square meter
kW	Kilowatt
LPD	Light power density (lighting power allowance)
L/s	Liters per second
Ls	Liner system
m ²	Square meters
MERV	Minimum efficiency reporting value
NAECA	National Appliance Energy Conservation Act
NPLV	Nonstandard Part Load Value
Pa	Pascal
PF	Projection factor
pcf	Pounds per cubic foot
psf	Pounds per square foot
PTAC	Packaged terminal air conditioner
PTHP	Packaged terminal heat pump
R-value	See Chapter 2—Definitions
SCOP	Sensible coefficient of performance
SEER	Seasonal energy efficiency ratio
SHGC	Solar Heat Gain Coefficient
SPVAC	Single packaged vertical air conditioner
SPVHP	Single packaged vertical heat pump
SRI	Solar reflectance index
SWF	Service water heat recovery factor
U-factor	See Chapter 2—Definitions
VAV	Variable air volume
VRF	Variable refrigerant flow
VT	Visible transmittance
W	Watts
w.c.	Water column
w.g.	Water gauge

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SCOPE AND ADMINISTRATION

User notes:

About this chapter:

Chapter 1 establishes the limits of applicability of the code and describes how the code is to be applied and enforced. Chapter 1 is in two parts: Part 1—Scope and Application and Part 2—Administration and Enforcement. Section C101 identifies what buildings, systems, appliances and equipment fall under its purview and references other I-Codes as applicable. Standards and codes are scoped to the extent referenced.

The code is intended to be adopted as a legally enforceable document and it cannot be effective without adequate provisions for its administration and enforcement. The provisions of Chapter 1 establish the authority and duties of the code official appointed by the authority having jurisdiction and also establish the rights and privileges of the design professional, contractor and property owner.

QR code use:

A QR code is placed at the beginning of any section that has undergone technical revision. To see those revisions, scan the QR code with a smart device or enter the 7-digit code beneath the QR code at the end of the following URL: qr.iccsafe.org/ (see Formatting Changes to the 2024 International Codes for more information).

PART 1—SCOPE AND APPLICATION

SECTION C101—SCOPE AND GENERAL REQUIREMENTS



C101.1 Title. This code shall be known as the *Energy Conservation Code* of [NAME OF JURISDICTION] and shall be cited as such. It is referred to herein as “this code.”

C101.2 Scope. This code applies to the design and construction of buildings not covered by the scope of the IECC—Residential Provisions.

C101.2.1 Appendices. Provisions in the appendices shall not apply unless specifically adopted.

C101.3 Intent. The IECC—Commercial Provisions provide market-driven, enforceable requirements for the design and construction of *commercial buildings*, providing minimum efficiency requirements for buildings that result in the maximum level of energy efficiency that is safe, technologically feasible, and life cycle cost effective, considering economic feasibility, including potential costs and savings for consumers and building owners, and return on investment. Additionally, the code provides jurisdictions with supplemental requirements, including ASHRAE 90.1, and optional requirements that lead to achievement of zero energy buildings, presently, and through glidepaths that achieve zero energy buildings by 2030 and on additional timelines sought by governments, and achievement of additional policy goals as identified by the Energy and Carbon Advisory Council and approved by the Board of Directors. Requirements contained in the code will include, but not be limited to, prescriptive- and performance-based pathways. The code may include nonmandatory appendices incorporating additional energy efficiency and greenhouse gas reduction resources developed by the International Code Council and others. The code will aim to simplify code requirements to facilitate the code’s use and compliance rate. The code is updated on a 3-year cycle with each subsequent edition providing increased energy savings over the prior edition. This code is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this intent. This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.

C101.4 Compliance. *Residential buildings* shall meet the provisions of IECC—Residential Provisions. *Commercial buildings* shall meet the provisions of IECC—Commercial Provisions.

C101.4.1 Compliance materials. The *code official* shall be permitted to approve specific computer software, worksheets, compliance manuals and other similar materials that meet the intent of this code.

SECTION C102—APPLICABILITY



C102.1 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

C102.1.1 Mixed residential and commercial buildings. Where a *building* includes both *residential building* and *commercial building* portions, each portion shall be separately considered and meet the applicable provisions of IECC—Commercial Provisions or IECC—Residential Provisions.

C102.2 Other laws. The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

C102.3 Applications of references. References to chapter or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such chapter, section or provision of this code.

C102.4 Referenced codes and standards. The codes and standards referenced in this code shall be those listed in Chapter 6, and such codes and standards shall be considered as part of the requirements of this code to the prescribed extent of each such reference and as further regulated in Sections C102.4.1 and C102.4.2.

C102.4.1 Conflicts. Where conflicts occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

C102.4.2 Provisions in referenced codes and standards. Where the extent of the reference to a referenced code or standard includes subject matter that is within the scope of this code, the provisions of this code, as applicable, shall take precedence over the provisions in the referenced code or standard.

C102.5 Partial invalidity. If a portion of this code is held to be illegal or void, such a decision shall not affect the validity of the remainder of this code.

PART 2—ADMINISTRATION AND ENFORCEMENT

SECTION C103—CODE COMPLIANCE AGENCY

C103.1 Creation of enforcement agency. The [INSERT NAME OF DEPARTMENT] is hereby created and the official in charge thereof shall be known as the authority having jurisdiction (AHJ). The function of the agency shall be the implementation, administration and enforcement of the provisions of this code.

C103.2 Appointment. The AHJ shall be appointed by the chief appointing authority of the jurisdiction.

C103.3 Deputies. In accordance with the prescribed procedures of this jurisdiction and with the concurrence of the appointing authority, the AHJ shall have the authority to appoint a deputy AHJ, other related technical officers, inspectors and other employees. Such employees shall have powers as delegated by the AHJ.



SECTION C104—ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

C104.1 General. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *code official* shall have the authority to approve an alternative material, design or method of construction upon the written application of the *owner* or the *owner's* authorized agent. The *code official* shall first find that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, *fire resistance*, durability, energy conservation and safety. The *code official* shall respond to the applicant, in writing, stating the reasons why the alternative was *approved* or was not *approved*.

C104.1.1 Above code programs. The *code official* or other authority having jurisdiction shall be permitted to deem a national, state or local energy efficiency program as exceeding the energy efficiency required by this code. Buildings *approved* in writing by such an energy efficiency program shall be considered to be in compliance with this code. The requirements identified in Table C407.2(1) shall be met.

SECTION C105—CONSTRUCTION DOCUMENTS

C105.1 General. *Construction documents* and other supporting data shall be submitted in one or more sets, or in a digital format where allowed by the *code official*, with each application for a permit. The *construction documents* shall be prepared by a *registered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary *construction documents* to be prepared by a *registered design professional*.

Exception: The *code official* is authorized to waive the requirements for *construction documents* or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

C105.2 Information on construction documents. *Construction documents* shall be drawn to scale on suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the *building*, systems and equipment as herein governed. Details shall include, but are not limited to, the following as applicable:

1. Energy compliance path.
2. Insulation materials and their *R*-values.
3. Fenestration *U*-factors and solar heat gain coefficients (SHGC).
4. Area-weighted *U*-factor and solar heat gain coefficient (SHGC) calculations.
5. *Air barrier* and air sealing details, including the location of the *air barrier*.
6. *Thermal bridges* as identified in Section C402.7.
7. Mechanical system design criteria.
8. Mechanical and service water-heating systems and equipment types, sizes and efficiencies.
9. Economizer description.
10. Equipment and system controls.



11. Fan motor horsepower (hp) and controls.
12. Duct sealing, *duct* and pipe insulation and location.
13. Lighting fixture schedule with wattage and control narrative.
14. Location of *daylight* zones on floor plans.
15. Location of pathways for routing of raceways or cable from the on-site renewable energy system to the electrical distribution equipment.
16. Location reserved for inverters, metering equipment and energy storage systems (ESS), and a pathway reserved for routing of raceways or conduit from the renewable energy system to the point of interconnection with the electrical service and the ESS.
17. Location and layout of a designated area for ESS.
18. Rated energy capacity and rated power capacity of the installed or planned ESS.

C105.2.1 Building thermal envelope depiction. The *building thermal envelope* shall be represented on the construction drawings.

C105.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying *construction documents* and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. The *code official* is authorized to utilize a *registered design professional*, or other *approved* entity not affiliated with the building design or construction, in conducting the review of the plans and specifications for compliance with the code.

C105.3.1 Approval of construction documents. When the *code official* issues a permit where *construction documents* are required, the *construction documents* shall be endorsed in writing and stamped “Reviewed for Code Compliance.” Such *approved construction documents* shall not be changed, modified or altered without authorization from the *code official*. Work shall be done in accordance with the *approved construction documents*.

One set of *construction documents* so reviewed shall be retained by the *code official*. The other set shall be returned to the applicant, kept at the site of work and shall be open to inspection by the *code official* or a duly authorized representative.

C105.3.2 Previous approvals. This code shall not require changes in the *construction documents*, construction or designated occupancy of a structure for which a lawful permit has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

C105.3.3 Phased approval. The *code official* shall have the authority to issue a permit for the construction of part of an energy conservation system before the *construction documents* for the entire system have been submitted or *approved*, provided that adequate information and detailed statements have been filed complying with all pertinent requirements of this code. The holders of such permit shall proceed at their own risk without assurance that the permit for the entire energy conservation system will be granted.

C105.4 Amended construction documents. Changes made during construction that are not in compliance with the *approved construction documents* shall be resubmitted for approval as an amended set of *construction documents*.

C105.5 Retention of construction documents. One set of *approved construction documents* shall be retained by the *code official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

C105.6 Building documentation and closeout submittal requirements. The *construction documents* shall specify that the documents described in this section be provided to the building owner or owner’s authorized agent within 90 days of the date of receipt of the certificate of occupancy.

C105.6.1 Record documents. *Construction documents* shall be updated to convey a record of the completed work. Such updates shall include mechanical, electrical and control drawings that indicate all changes to size, type and location of components, equipment and assemblies.

C105.6.2 Compliance documentation. Energy code compliance documentation and supporting calculations shall be delivered in one document to the building owner as part of the project record documents or manuals, or as a standalone document. This document shall include the specific energy code edition utilized for compliance determination for each system, documentation demonstrating compliance with Section C303.1.3 for each fenestration product installed, and the interior lighting power compliance path, building area or space-by-space, used to calculate the lighting power allowance.

For projects complying with Item 2 of Section C401.2, the documentation shall include:

1. The envelope insulation compliance path.
2. All compliance calculations including those required by Sections C402.1.4, C403.8.1, C405.3 and C405.5.
3. A plan for annual energy use data gathering and disclosure as specified in Section C405.13.

For projects complying with Section C407, the documentation shall include that required by Sections C407.3.1 and C407.3.2.

C105.6.3 Systems operation control. Training shall be provided to those responsible for maintaining and operating equipment included in the manuals required by Section C105.6.2.

The training shall include:

1. Review of manuals and permanent certificate.

2. Hands-on demonstration of all normal maintenance procedures, normal operating modes, and all emergency shutdown and startup procedures.
3. Training completion report.

SECTION C106—FEES

C106.1 Fees. A permit shall not be valid until the fees prescribed by law have been paid. Nor shall an amendment to a permit be released until the additional fee, if any, has been paid.

C106.2 Schedule of permit fees. A fee for each permit shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

C106.3 Valuation of work. The applicant for a permit shall provide an estimated value of the work for which the permit is being issued at the time of application. Such estimated valuations shall include the total value of the work, including materials and labor. Where, in the opinion of the *code official*, the valuation is underestimated, the permit shall be denied unless the applicant can show detailed estimates acceptable to the *code official*. The final valuation shall be *approved* by the *code official*.

C106.4 Work commencing before permit issuance. Any person who commences any work before obtaining the necessary permits shall be subject to a fee established by the *code official* that shall be in addition to the required permit fees.

C106.5 Related fees. The payment of the fee for the construction, *alteration*, removal or demolition of work done in connection to or concurrently with the work or activity authorized by a permit shall not relieve the applicant or holder of the permit from the payment of other fees that are prescribed by law.

C106.6 Refunds. The *code official* is authorized to establish a refund policy.



SECTION C107—INSPECTIONS

C107.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official*, his or her designated agent or an *approved agency*, and such construction or work shall remain visible and able to be accessed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

C107.2 Required inspections. The *code official*, his or her designated agent or an *approved agency*, upon notification, shall make the inspections set forth in Sections C107.2.1 through C107.2.6.



C107.2.1 Footing and foundation insulation. Inspections shall verify the footing and foundation insulation *R-value*, location, thickness, depth of burial and protection of insulation as required by the code, *approved* plans and specifications.

C107.2.2 Building thermal envelope. Inspections shall verify the type of insulation, *R-values*, location of insulation, *thermal bridge* mitigation, *fenestration*, *U-factor*, SHGC and VT, and that *air leakage* controls are installed, as required by the code, *approved* plans and specifications.

C107.2.3 Plumbing system. Inspections shall verify the type of insulation, *R-values*, protection required, controls and *heat traps* as required by the code, *approved* plans and specifications.

C107.2.4 Mechanical system. Inspections shall verify the installed HVAC equipment for the type and size, controls, insulation, *R-values*, system and damper *air leakage*, minimum fan efficiency, energy recovery and economizer as required by the code, *approved* plans and specifications.

C107.2.5 Electrical system. Inspections shall verify lighting system controls, components and meters as required by the code, *approved* plans and specifications. Where an ESS area is required, inspections shall verify space availability and pathways to electrical service.

C107.2.6 Final inspection. The final inspection shall include verification of the installation and proper operation of all required building controls, and documentation verifying activities associated with required *building commissioning* have been conducted in accordance with Section C408.

C107.3 Reinspection. A *building* shall be reinspected where determined necessary by the *code official*.

C107.4 Approved inspection agencies. The *code official* is authorized to accept reports of third-party inspection agencies not affiliated with the building design or construction, provided that such agencies are *approved* as to qualifications and reliability relevant to the building components and systems that they are inspecting.

C107.5 Inspection requests. It shall be the duty of the holder of the permit or their duly authorized agent to notify the *code official* when work is ready for inspection. It shall be the duty of the permit holder to provide *access* to and means for inspections of such work that are required by this code.

C107.6 Reinspection and testing. Where any work or installation does not pass an initial test or inspection, the necessary corrections shall be made to achieve compliance with this code. The work or installation shall then be resubmitted to the *code official* for inspection and testing.

SECTION C108—NOTICE OF APPROVAL

C108.1 Approval. After the prescribed tests and inspections indicate that the work complies in all respects with this code, a notice of approval shall be issued by the *code official*.

C108.2 Revocation. The *code official* is authorized to suspend or revoke, in writing, a notice of approval issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the *building* or structure, premise, or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

SECTION C109—MEANS OF APPEALS



C109.1 General. In order to hear and decide appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The board of appeals shall be appointed by the governing authority and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *code official*.

C109.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equally good or better form of construction is proposed. The board shall not have authority to waive requirements of this code.

C109.3 Qualifications. The board of appeals shall consist of members who are qualified by experience and training on matters pertaining to the provisions of this code and are not employees of the jurisdiction.

C109.4 Administration. The *code official* shall take action in accordance with the decisions of the board.

SECTION C110—STOP WORK ORDER

C110.1 Authority. Where the *code official* finds any work regulated by this code being performed in a manner contrary to the provisions of this code or in a dangerous or unsafe manner, the *code official* is authorized to issue a stop work order.

C110.2 Issuance. The stop work order shall be in writing and shall be given to the *owner* of the property, the owner's authorized agent or the person performing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

C110.3 Emergencies. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work.

C110.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to fines established by the AHJ.

User notes:**About this chapter:**

Codes, by their very nature, are technical documents. Every word, term and punctuation mark can add to or change the meaning of a technical requirement. It is necessary to maintain a consensus on the specific meaning of each term contained in the code. Chapter 2 performs this function by stating clearly what specific terms mean for the purposes of the code.

SECTION C201—GENERAL

C201.1 Scope. Unless stated otherwise, the following words and terms in this code shall have the meanings indicated in this chapter.

C201.2 Interchangeability. Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural includes the singular.

C201.3 Terms defined in other codes. Terms that are not defined in this code but are defined in the *International Building Code*, *International Fire Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* or the *International Residential Code* shall have the meanings ascribed to them in those codes.

C201.4 Terms not defined. Terms not defined by this chapter shall have ordinarily accepted meanings such as the context implies.

SECTION C202—GENERAL DEFINITIONS

ABOVE-GRADE WALL. See “Wall, above-grade.”

ACCESS (TO). That which enables a device, appliance or equipment to be reached by *ready access* or by a means that first requires the removal or movement of a panel or similar obstruction.

ADDITION. An extension or increase in the *conditioned space* floor area, number of stories or height of a *building* or structure.

AIR BARRIER. One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the *building thermal envelope* and its assemblies.

AIR CURTAIN UNIT. A device installed at the building entrance that generates and discharges a laminar airstream intended to prevent the *infiltration* of external, unconditioned air into the conditioned spaces or the loss of interior, conditioned air to the outside.

AIR LEAKAGE. The uncontrolled airflow through the *building thermal envelope* caused by pressure differences across the *building thermal envelope*. Air leakage can be inward (*infiltration*) or outward (*exfiltration*) through the *building thermal envelope*.

ALTERATION. Any construction, retrofit or renovation to an existing structure other than *repair* or *addition*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, *addition* or change to the arrangement, type or purpose of the original installation.

APPROVED. Acceptable to the *code official*.

APPROVED AGENCY. An established and recognized agency that is regularly engaged in conducting tests or furnishing inspection services, or furnishing product certification, where such agency has been *approved* by the *code official*.

APPROVED SOURCE. An independent person, firm or corporation *approved* by the code official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

AUTOMATIC. Self-acting, operating by its own mechanism when actuated by some impersonal influence, as, for example, a change in current strength, pressure, temperature or mechanical configuration (see “Manual”).

BELOW-GRADE WALL. See “Wall, below-grade.”

BEST EFFICIENCY POINT (BEP). The pump hydraulic power operating point (consisting of both flow and head conditions) that results in the maximum efficiency.

BIOGAS. A mixture of hydrocarbons that is a gas at 60°F (15.5°C) and 1 atmosphere of pressure that is produced through the anaerobic digestion of organic matter.

BIOMASS WASTE. Organic nonfossil material of biological origin that is a byproduct or a discarded product. *Biomass waste* includes municipal solid waste from biogenic sources; landfill gas; sludge waste; agricultural crop byproducts; straw; and other biomass solids, liquids and biogases, but excludes wood and wood-derived fuels (including black liquor), biofuel feedstock, biodiesel and fuel ethanol.

BOILER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure.



DEFINITIONS

BUILDING. Any structure used or intended for supporting or sheltering any use or occupancy, including any mechanical systems, service water-heating systems and electric power and lighting systems located on the *building site* and supporting the *building*.

BUILDING COMMISSIONING. A process that verifies and documents that the selected building systems have been designed, installed and function according to the *owner's* project requirements and *construction documents*, and to minimum code requirements.

BUILDING ENTRANCE. Any door, set of doors, doorway or other form of portal that is used to gain access to the *building* from the outside by the public.

BUILDING SITE. A contiguous area of land that is under the ownership or control of one entity.

BUILDING THERMAL ENVELOPE. The basement walls, *exterior walls*, floors, ceilings, roofs and any other building element assemblies that enclose *conditioned space* or provide a boundary between *conditioned space* and exempt or unconditioned space.

CAPTIVE KEY OVERRIDE. A lighting control that will not release the key that activates the override when the lighting is on.

CAVITY INSULATION. Insulating material located between framing members.

C-FACTOR (THERMAL CONDUCTANCE). The coefficient of heat transmission (surface to surface) through a building component or assembly, equal to the time rate of heat flow per unit area and the unit temperature difference between the warm side and cold side surfaces ($\text{Btu/h} \times \text{ft}^2 \times ^\circ\text{F}$) [$\text{W}/(\text{m}^2 \times \text{K})$].

CHANGE OF OCCUPANCY. A change in the use of a *building* or a portion of a *building* that results in any of the following:

1. A *change of occupancy* classification.
2. A change from one group to another group within an occupancy classification.
3. Any change in use within a group for which there is a change in the application of the requirements of this code.

CHI-FACTOR (χ -FACTOR). The heat loss factor for a single *thermal bridge* characterized as a point element of a *building thermal envelope* ($\text{Btu/h} \times ^\circ\text{F}$) [W/k].

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to the fixture supply and back to the water-heating equipment.

CLEAN WATER PUMP. A device that is designed for use in pumping water with a maximum nonabsorbent free solid content of 0.016 lb/ft^3 (0.256 kg/m^3) and with a maximum dissolved solid content of 3.1 lb/ft^3 (49.66 kg/m^3), provided that the total gas content of the water does not exceed the saturation volume, and disregarding any additives necessary to prevent the water from freezing at a minimum of 14°F (-10°C).

CLIMATE ZONE. A geographical region based on climatic criteria as specified in this code.

CODE OFFICIAL. The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

COEFFICIENT OF PERFORMANCE (COP) – COOLING. The ratio of the rate of heat removal to the rate of energy input, in consistent units, for a complete refrigerating system or some specific portion of that system under designated operating conditions.

COEFFICIENT OF PERFORMANCE (COP) – HEATING. The ratio of the rate of heat delivered to the rate of energy input, in consistent units, for a complete heat pump system, including the compressor and, if applicable, auxiliary heat, under designated operating conditions.

COMMERCIAL BUILDING. For this code, all buildings that are not included in the definition of “*Residential building*.”

COMMON AREAS. All conditioned spaces within *Group R* occupancy buildings that are not *dwelling units* or *sleeping units*.

COMMUNITY RENEWABLE ENERGY FACILITY. A facility that produces energy harvested from *renewable energy resources* and is qualified as a community energy facility under applicable jurisdictional statutes and rules.

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data which has a design total *information technology equipment* (ITE) equipment power density less than or equal to 20 watts per square foot (20 watts per 0.092 m^2) of conditioned area or a design total ITE equipment load less than or equal to 10 kW.

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively cooled or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

CONDITIONED FLOOR AREA. The horizontal projection of the floors associated with the *conditioned space*.

CONDITIONED SPACE. An area, room or space that is enclosed within the *building thermal envelope* and is directly or indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate through openings with *conditioned spaces*, where they are separated from *conditioned spaces* by uninsulated walls, floors or ceilings, or where they contain uninsulated *ducts*, piping or other sources of heating or cooling.

CONGREGATE LIVING FACILITIES. A *building* or part thereof that contains *sleeping units* where residents share bathroom or kitchen facilities, or both.

CONSTRUCTION DOCUMENTS. Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit.

CONTINUOUS INSULATION (ci). Insulating material that is continuous across all structural members without *thermal bridges* other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the *building thermal envelope*.

CRAWL SPACE WALL. The opaque portion of a wall that encloses a crawl space and is partially or totally below grade.

CURTAIN WALL. Fenestration products used to create an external nonload-bearing wall that is designed to separate the exterior and interior environments.

DATA CENTER. A room or series of rooms that share *data center systems*, whose primary function is to house equipment for the processing and storage of electronic data and that has a design total ITE equipment power density exceeding 20 watts per square foot (20 watts per 0.092 m²) of conditioned area and a total design ITE equipment load greater than 10 kW.

DATA CENTER SYSTEMS. HVAC systems and equipment, or portions thereof, used to provide cooling or *ventilation* in a *data center*.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides *automatic* control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is illuminated by natural light.

DEDICATED OUTDOOR AIR SYSTEM (DOAS). A ventilation system that supplies 100 percent outdoor air primarily for the purpose of *ventilation* and that is a separate system from the *zone* space-conditioning system.

DEHUMIDIFIER. A self-contained, electrically operated and mechanically encased product with the sole purpose of dehumidifying the space consisting of the following:

1. A refrigerated surface (evaporator) that condenses moisture from the atmosphere.
2. A refrigerating system, including an electric motor.
3. An air-circulating fan.
4. A means for collecting or disposing of the condensate.

A dehumidifier does not include a portable air conditioner, room air conditioner or packaged terminal air conditioner.

DEMAND CONTROL KITCHEN VENTILATION (DCKV). A system that provides *automatic*, continuous control over exhaust hood and makeup air fan speed in response to temperature, optical or infrared (IR) sensors that monitor cooking activity or through direct communication with cooking appliances.

DEMAND CONTROL VENTILATION (DCV). A ventilation system capability that provides for the *automatic* reduction of outdoor air intake below design rates when the actual occupancy of spaces served by the system is less than design occupancy.

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one or more pumps prime the service hot water piping with heated water upon a demand for hot water.

DEMAND RESPONSE SIGNAL. A signal that indicates a price or a request to modify electricity consumption for a limited time period.

DEMAND RESPONSIVE CONTROL. A control capable of receiving and automatically responding to a *demand response signal*.

DESSICANT DEHUMIDIFICATION SYSTEM. A mechanical dehumidification technology that uses a solid or liquid material to remove moisture from the air.

DIRECT DIGITAL CONTROL (DDC). A type of control where controlled and monitored analog or binary data, such as temperature and contact closures, are converted to digital format for manipulation and calculations by a digital computer or microprocessor, then converted back to analog or binary form to control physical devices.

DUCT. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air *ducts*.

DUCT SYSTEM. A continuous passageway for the transmission of air that, in addition to *ducts*, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

DWELLING UNIT. A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

DX-DEDICATED OUTDOOR AIR SYSTEM UNIT (DX-DOAS UNIT). A type of air-cooled, water-cooled or water source factory-assembled product that dehumidifies 100 percent outdoor air to a low dew point and includes reheat that is capable of controlling the supply dry-bulb temperature of the dehumidified air to the designated supply air temperature. It may precondition outdoor air with an *energy recovery ventilation system*.

DYNAMIC GLAZING. Any fenestration product that has the fully reversible ability to change its performance properties, including *U-factor*, *solar heat gain coefficient* (SHGC) or *visible transmittance* (VT).

EAST-ORIENTED. Facing within 45 degrees of true east to the south and within less than 22.5 degrees of true east to the north in the northern hemisphere or facing within 45 degrees of true east to the north and within less than 22.5 degrees of true east to the south in the southern hemisphere.

ECONOMIZER, AIR. A *duct* and damper arrangement and *automatic* control system that allows a cooling system to supply outside air to reduce or eliminate the need for mechanical cooling during mild or cold weather.

ECONOMIZER, WATER. A system where the supply air of a cooling system is cooled indirectly with water that is itself cooled by heat or mass transfer to the environment without the use of mechanical cooling.

EMITTANCE. The ratio of the radiant heat flux emitted by a specimen measured on a scale from 0 to 1, where a value of 1 indicates perfect release of thermal radiation.

DEFINITIONS

ENCLOSED SPACE. A volume surrounded by solid surfaces such as walls, floors, roofs and openable devices, such as doors and operable windows.

ENERGY ANALYSIS. A method for estimating the annual energy use of the *proposed design* and *standard reference design* based on estimates of energy use.

ENERGY COST. The total estimated annual cost for *purchased energy* for the building functions regulated by this code, including applicable demand charges.

ENERGY RECOVERY, SERIES. A three-step process in which the first step is to remove energy from a single airstream without the use of mechanical cooling. In the second step, the airstream is mechanically cooled for the purpose of dehumidification. In the third step, the energy removed in the first step is reintroduced to the airstream.

ENERGY RECOVERY RATIO, SERIES (SERR). The difference between the dry-bulb air temperatures leaving the *series energy recovery* unit and leaving the dehumidifying coil divided by the difference between 75°F (24°C) and the dry-bulb temperature of the air leaving the dehumidifying cooling coil.

ENERGY RECOVERY VENTILATION SYSTEM. Systems that employ air-to-air heat exchangers to recover energy from exhaust air for the purpose of preheating, precooling, humidifying or dehumidifying outdoor *ventilation air* prior to supplying the air to a space, either directly or as part of an HVAC system.

ENERGY SIMULATION TOOL. An *approved* software program or calculation-based methodology that projects the annual energy use of a *building*.

ENERGY STORAGE SYSTEM (ESS). One or more devices, assembled together, capable of storing energy in order to supply electrical energy at a future time.

ENERGY USE INTENSITY (EUI). The metric indicating the total amount of energy consumed by a *building* in 1 year divided by the gross floor area of the *building*.

ENTHALPY RECOVERY RATIO (ERR). Change in the enthalpy of the outdoor air supply divided by the difference between the outdoor air and entering exhaust air enthalpy, expressed as a percentage.

ENTRANCE DOOR. A vertical *fenestration* product used for occupant ingress, egress and access in nonresidential buildings, including, but not limited to, exterior entrances utilizing latching hardware and *automatic* closers and containing over 50 percent glazing specifically designed to withstand heavy-duty usage.

EQUIPMENT ROOM. A space that contains either electrical equipment, mechanical equipment, machinery, water pumps or hydraulic pumps that are a function of the building's services.

EXTERIOR WALL. Walls including both *above-grade walls* and basement walls.

EXTERIOR WALL ENVELOPE. A system or assembly of exterior wall components, including exterior wall finish materials, that provides protection of the building structural members, including framing and sheathing materials, and conditioned interior space from the detrimental effects of the exterior environment.

FAN, EMBEDDED. A fan that is part of a manufactured assembly where the assembly includes functions other than air movement.

FAN ARRAY. Multiple fans in parallel between two plenum sections in an air distribution system.

FAN BRAKE HORSEPOWER (BHP). The horsepower delivered to the fan's shaft. Brake horsepower does not include the mechanical drive losses, such as that from belts and gears.

FAN ELECTRICAL INPUT POWER. The electrical input power in kilowatts required to operate an individual fan or *fan array* at design conditions. It includes the power consumption of motor controllers, where present.

FAN ENERGY INDEX (FEI). The ratio of the electric input power of a reference fan to the electric input power of the actual fan as calculated in accordance with AMCA 208.

FAN NAMEPLATE ELECTRICAL INPUT POWER. The nominal electrical input power rating stamped on a fan assembly nameplate.

FAN SYSTEM. All the fans that contribute to the movement of air serving spaces that pass through a point of a common *duct*, plenum or cabinet.

FAN SYSTEM, COMPLEX. A *fan system* that combines a *single-cabinet fan system* with other supply fans, exhaust fans or both.

FAN SYSTEM, EXHAUST OR RELIEF. A *fan system* dedicated to the removal of air from interior spaces to the outdoors.

FAN SYSTEM, RETURN. A *fan system* dedicated to removing air from the interior where some or all the air is to be recirculated except during economizer operation.

FAN SYSTEM, SINGLE-CABINET. A *fan system* that supplies air to a space and recirculates the air, wherein a single cabinet houses a single fan, a single *fan array*, a single set of fans operating in parallel or fans or fan arrays in series.

FAN SYSTEM, TRANSFER. A *fan system* that exclusively moves air from one occupied space to another.

FAN SYSTEM AIRFLOW. The sum of the airflow of all fans with *fan electrical input power* greater than 1 kW at *fan system design conditions*, excluding the airflow that passes through downstream fans with *fan electrical input power* less than 1 kW.

FAN SYSTEM BHP. The sum of the *fan brake horsepower* of all fans that are required to operate at *fan system design conditions* to supply air from the heating or cooling source to the *conditioned spaces* and return it to the source or exhaust it to the outdoors.

FAN SYSTEM DESIGN CONDITIONS. Operating conditions that can be expected to occur during normal system operation that result in the highest supply fan airflow rate to *conditioned spaces* served by the system, other than during *air economizer* operation.

FAN SYSTEM ELECTRICAL INPUT POWER. The sum of the fan electrical power of all fans that are required to operate at *fan system design conditions* to supply air from the heating or cooling source to the *conditioned spaces* and/or return it to the source or exhaust it to the outdoors.

FAN SYSTEM MOTOR NAMEPLATE HP. The sum of the motor *nameplate horsepower* of all fans that are required to operate at design conditions to supply air from the heating or cooling source to the *conditioned spaces* and return it to the source or exhaust it to the outdoors.

FAULT DETECTION AND DIAGNOSTICS (FDD) SYSTEM. A software platform that utilizes building analytic algorithms to convert data provided by sensors and devices to automatically identify faults in building systems and provide a prioritized list of actionable resolutions to those faults based on cost or energy avoidance, comfort and maintenance impact.

FENESTRATION. Products classified as either skylights or vertical *fenestration*.

FENESTRATION PRODUCT, FIELD-FABRICATED. A fenestration product whose frame is made at the construction site of standard dimensional lumber or other materials that were not previously cut or otherwise formed with the specific intention of being used to fabricate a fenestration product or exterior door. Field-fabricated does not include site-built fenestration.

FENESTRATION PRODUCT, SITE-BUILT. A *fenestration* designed to be made up of field-glazed or field-assembled units using specific factory cut or otherwise factory-formed framing and glazing units. Examples of site-built fenestration include *storefront* systems, *curtain walls* and atrium roof systems.

F-FACTOR. The perimeter heat loss factor per unit perimeter length of slab-on-grade floors (Btu/h × ft × °F) [W/(m × K)].

FINANCIAL RENEWABLE ENERGY POWER PURCHASE AGREEMENT. A financial arrangement between a renewable electricity generator and a purchaser wherein the purchaser pays or guarantees a price to the generator for the project's renewable generation. Also known as a "financial power purchase agreement" and "virtual power purchase agreement."

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

GENERAL LIGHTING. Interior lighting that provides a substantially uniform level of illumination throughout a space.

GREEN RETAIL TARIFF. An electricity-rate structure qualified under applicable statutes or rules contracted by an electricity service provider to the building project owner to provide electricity generated with 100 percent *renewable energy resources* without the purchase of unbundled renewable energy certificates (RECs).

GREENHOUSE. A structure or a thermally isolated area of a *building* that maintains a specialized sunlit environment with a skylight roof ratio of 50 percent or more above the growing area exclusively used for, and essential to, the cultivation, protection or maintenance of plants. *Greenhouses* are those that are erected for a period of 180 days or more.

GROUP R. Buildings or portions of buildings that contain any of the following occupancies as established in the *International Building Code*:

1. Group R-1.
2. Group R-2 where located more than three stories in height above grade plane.
3. Group R-4 where located more than three stories in height above grade plane.

HEAT TRAP. An arrangement of piping and fittings, such as elbows, or a commercially available *heat trap* that prevents thermosyphoning of hot water during standby periods.

HEATED SLAB. Slab-on-grade construction in which the heating elements, hydronic tubing or hot air distribution system is in contact with, or placed within or under, the slab.

HIGH SPEED DOOR. A nonswinging door used primarily to facilitate vehicular access or material transportation, with a minimum opening rate of 32 inches (813 mm) per second, a minimum closing rate of 24 inches (610 mm) per second and that includes an automatic-closing device.

HIGH-CAPACITY GAS-FIRED WATER HEATER. Gas-fired instantaneous *water heaters* with a rated input greater than 200,000 Btu/h (58.6 kW) and not less than 4,000 Btu/h per gallon (310 W per liter) of stored water. Also, gas-fired storage *water heaters* with a rated input both greater than 105,000 Btu/h (30.8 kW) and less than 4,000 Btu/h per gallon (310 W per liter) of stored water.

HIGH-END TRIM. A lighting control setting that limits the maximum power to individual luminaires or groups of luminaires in a space.

HISTORIC BUILDING. Any *building* or structure that is one or more of the following:

1. Listed, or certified as eligible for listing, by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register-listed, state-designated or locally designated historic district.

HORTICULTURAL LIGHTING. Electric lighting used for horticultural production, cultivation or maintenance.

HUMIDISTATIC CONTROLS. *Automatic* controls used to maintain humidity at a setpoint.

HVAC TOTAL SYSTEM PERFORMANCE RATIO (HVAC TSPR). The ratio of the sum of a building's annual heating and cooling load in thousands of Btu's to the sum of annual site energy consumption of the building HVAC systems in Btu.

DEFINITIONS

IEC DESIGN H MOTOR. An electric motor that meets all of the following:

1. It is an induction motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.
4. It has four, six or eight poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 hertz.

IEC DESIGN N MOTOR. An electric motor that meets all of the following:

1. It is an induction motor designed for use with three-phase power.
2. It contains a cage rotor.
3. It is capable of direct-on-line starting.
4. It has two, four, six or eight poles.
5. It is rated from 0.4 kW to 1600 kW at a frequency of 60 hertz.

INDOOR GROW. A space, other than a *greenhouse*, used exclusively for and essential to horticultural production, cultivation or maintenance.

INFILTRATION. The uncontrolled inward *air leakage* into a *building* caused by the pressure effects of wind or the effect of differences in the indoor and outdoor air density or both.

INFORMATION TECHNOLOGY EQUIPMENT (ITE). Items including computers, data storage devices, servers and network and communication equipment.

INTEGRATED HVAC SYSTEM. An HVAC system designed to handle both sensible and latent heat removal. *Integrated HVAC systems* include, but are not limited to, HVAC systems with a sensible heat ratio of 0.65 or less and the capability of providing cooling, dedicated outdoor air systems, single-package air conditioners with at least one refrigerant circuit providing hot gas reheat, and *dehumidifiers* modified to allow external heat rejection.

INTEGRATED PART LOAD VALUE (IPLV). A single-number figure of merit based on part-load EER, COP or kW/ton expressing part-load efficiency for air-conditioning and heat pump equipment on the basis of weighted operation at various load capacities for equipment.

INTERNAL CURTAIN SYSTEM. A system consisting of movable panels of fabric or plastic film used to cover and uncover the space enclosed in a *greenhouse* on a daily basis.

ISOLATION DEVICES. Devices that isolate HVAC *zones* so that they can be operated independently of one another. *Isolation devices* include separate systems, isolation dampers and controls providing shutoff at terminal boxes.

LABELED. Equipment, materials or products to which have been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, *approved agency* or other organization concerned with product evaluation that maintains periodic inspection of the production of the *labeled* items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

LARGE-DIAMETER CEILING FAN. A ceiling fan that is greater than or equal to $84\frac{1}{2}$ inches (2.15 m) in diameter. These fans are sometimes referred to as High-Volume, Low-Speed (HVLS) fans.

LINER SYSTEM (Ls). A system that includes the following:

1. A continuous vapor barrier liner membrane that is installed below the purlins and that is uninterrupted by framing members.
2. An uncompressed, unfaced insulation resting on top of the liner membrane and located between the purlins.

For multilayer installations, the last rated *R*-value of insulation is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.

LISTED. Equipment, materials, products or services included in a list published by an organization acceptable to the *code official* and concerned with evaluation of products or services that maintains periodic inspection of production of *listed* equipment or materials or periodic evaluation of services and whose listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

LOW SLOPE. A slope less than 2 units vertical in 12 units horizontal (17 percent slope) as applied to roofs.

LOW-VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER. A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 volts and is rated for operation at a frequency of 60 hertz.

LUMINAIRE-LEVEL LIGHTING CONTROLS. A lighting system consisting of one or more luminaires with embedded lighting control logic, occupancy and ambient light sensors, wireless networking capabilities and local override switching capability, where required.

MANUAL. Capable of being operated by personal intervention (see “*Automatic*”).

NAMEPLATE HORSEPOWER. The nominal motor output power rating stamped on the motor nameplate.

NEMA DESIGN A MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting and develop locked-rotor torque as shown in paragraph 12.38.1 of NEMA MG 1.
2. It has pull-up torque not less than the values shown in paragraph 12.40.1 of NEMA MG 1.

3. It has breakdown torque not less than the values shown in paragraph 12.39.1 of NEMA MG 1.
4. It has a locked-rotor current higher than the values shown in paragraph 12.35.1 of NEMA MG 1 for 60 hertz and paragraph 12.35.2 of NEMA MG 1 for 50 hertz.
5. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN B MOTOR. A squirrel-cage motor that meets all of the following:

1. It is designed to withstand full-voltage starting.
2. It develops locked-rotor, breakdown and pull-up torques adequate for general application as specified in Sections 12.38, 12.39 and 12.40 of NEMA MG1.
3. It draws locked-rotor current not to exceed the values shown in Section 12.35.1 for 60 hertz and Section 12.35.2 for 50 hertz of NEMA MG1.
4. It has a slip at rated load of less than 5 percent for motors with fewer than 10 poles.

NEMA DESIGN C MOTOR. A squirrel-cage motor that meets all of the following:

1. Designed to withstand full-voltage starting and develop locked-rotor torque for high-torque applications up to the values shown in paragraph 12.38.2 of NEMA MG1 (incorporated by reference, see A\$431.15).
2. It has pull-up torque not less than the values shown in paragraph 12.40.2 of NEMA MG1.
3. It has breakdown torque not less than the values shown in paragraph 12.39.2 of NEMA MG1.
4. It has a locked-rotor current not to exceed the values shown in paragraph 12.35.1 of NEMA MG1 for 60 hertz and paragraph 12.35.2 for 50 hertz.
5. It has a slip at rated load of less than 5 percent.

NETWORKED GUESTROOM CONTROL SYSTEM. A control system, with access from the front desk or other central location associated with a *Group R-1 building*, that is capable of identifying the rented and unrented status of each guestroom according to a timed schedule, and is capable of controlling HVAC in each hotel and motel guestroom separately.

NONSTANDARD PART LOAD VALUE (NPLV). A single-number part-load efficiency figure of merit calculated and referenced to conditions other than IPLV conditions, for units that are not designed to operate at AHRI standard rating conditions.

NORTH-ORIENTED. Facing within 67.5 degrees of true north in the northern hemisphere or facing within 67.5 degrees of true south in the southern hemisphere.

OCCUPANT SENSOR CONTROL. An *automatic* control device or system that detects the presence or absence of people within an area and causes lighting, equipment or appliances to be regulated accordingly.

OCCUPIED-STANDBY MODE. Mode of operation when an HVAC *zone* is scheduled to be occupied and an occupant sensor indicates no occupants are within the zone.

ON-SITE RENEWABLE ENERGY. Energy from *renewable energy resources* harvested at the building project site.

OPAQUE DOOR. A door that is not less than 50 percent opaque in surface area.

OWNER. Any person, agent, operator, entity, firm or corporation having any legal or equitable interest in the property; or recorded in the official records of the state, county or municipality as holding an interest or title to the property; or otherwise having possession or control of the property, including the guardian of the estate of any such person, and the executor or administrator of the estate of such person if ordered to take possession of real property by a court.

PARKING AREA, EXTERIOR. Parking spaces, drive aisles and ramps that are not located within a *building*, or that are located on a roof.

PARKING AREA, INTERIOR. Parking spaces, drive aisles and ramps located within a *building*.

PARKING GARAGE SECTION. A part of an enclosed parking garage that is separated from all other parts of the garage by full-height solid walls or operable openings that are intended to remain closed during normal operation and where vehicles cannot pass to other parts of the garage. A parking garage can have one or more *parking garage sections*, and *parking garage sections* can include multiple floors.

PHOTOSYNTHETIC PHOTON EFFICACY (PPE). Photosynthetic photon flux emitted by a light source divided by its electrical input power in units of micromoles per second per watt, or micromoles per joule ($\mu\text{mol/J}$) between 400–700nm as defined by ANSI/ASABE S640.

PHYSICAL RENEWABLE ENERGY POWER PURCHASE AGREEMENT. A contract for the purchase of renewable electricity from a specific renewable electricity generator to a purchaser of renewable electricity.

POWERED ROOF/WALL VENTILATORS. A fan consisting of a centrifugal or axial impeller with an integral driver in a weather-resistant housing and with a base designed to fit, usually by means of a curb, over a wall or roof opening.

PROCESS APPLICATION. A manufacturing, industrial or commercial procedure or activity where the primary purpose is other than conditioning spaces and maintaining comfort and amenities for the occupants of a building.

PROPOSED DESIGN. A description of the proposed building used to estimate annual energy use for determining compliance based on simulated *building* performance and HVAC total system performance ratio.

PSI-FACTOR (ψ -FACTOR). The heat loss factor per unit length of a *thermal bridge* characterized as a linear element of a *building thermal envelope* ($\text{Btu/h} \times \text{ft} \times ^\circ\text{F}$) [$\text{W}/(\text{m} \times \text{K})$].

DEFINITIONS

PUMP ENERGY INDEX (PEI). The ratio of a pump's energy rating divided by the energy rating of a minimally compliant pump. For pumps with the constant load operating mode, the relevant PEI is PEI_{CL} . For pumps with the variable load operating mode, the relevant PEI is PEI_{VL} .

PURCHASED ENERGY. Energy or power purchased for consumption and delivered to the building site.

RADIANT HEATING SYSTEM. A heating system that transfers heat to objects and surfaces within a *conditioned space*, primarily by infrared radiation.

READY ACCESS (TO). That which enables a device, appliance or equipment to be directly reached without requiring the removal or movement of any panel or similar obstruction.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F (0°C) that can be walked into and has a total chilled storage area of not less than 3,000 square feet (279 m²).

REFRIGERATED WAREHOUSE FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F (0°C) that can be walked into and has a total chilled storage area of not less than 3,000 square feet (279 m²).

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

RENEWABLE ENERGY CERTIFICATE (REC). A market-based instrument that represents and conveys the environmental, social and other nonpower attributes of 1 megawatt hour of renewable electricity generation and could be sold separately from the underlying physical electricity associated with *renewable energy resources*, also known as energy attribute and energy attribute certificate (EAC).

RENEWABLE ENERGY INVESTMENT FUND (REIF). A fund established by a jurisdiction to accept payment from building project owners to construct or acquire interests in qualifying renewable energy systems, together with their associated RECs, on the building project owners' behalf.

RENEWABLE ENERGY RESOURCES. Energy derived from solar radiation, wind, waves, tides, *biomass waste* or extracted from hot fluid or steam heated within the earth.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

REROOFING. The process of recovering or replacing an existing roof covering. See "*Roof recover*" and "*Roof replacement*."

RESIDENTIAL BUILDING. For this code, includes detached one- and two-family dwellings and multiple single-family dwellings (townhouses) and *Group R-2*, *R-3* and *R-4* buildings three stories or less in height above grade plane.

ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A *roof assembly* includes the roof covering, underlayment, roof deck, insulation, vapor retarder and interior finish.

ROOF RECOVER. The process of installing an additional roof covering over an existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

ROOF REPLACEMENT. An *alteration* that includes the removal of all existing layers of *roof assembly* materials down to the roof deck and the installation of replacement materials above the existing roof deck.

ROOFTOP MONITOR. A raised section of a roof containing vertical *fenestration* along one or more sides.

R-VALUE (THERMAL RESISTANCE). The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ($h \times ft^2 \times ^\circ F/Btu$) [$(m^2 \times K)/W$].

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants, and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

SENSIBLE ENERGY RECOVERY RATIO. Change in the dry-bulb temperature of the outdoor air supply divided by the difference between the outdoor air and entering exhaust air dry-bulb temperatures, expressed as a percentage.

SERVICE WATER HEATING. Supply of hot water for purposes other than comfort heating.

SIMULATED BUILDING PERFORMANCE. A process in which the proposed building design is compared to a *standard reference design* for the purposes of estimating relative energy use against a baseline to determine code compliance.

SLEEPING UNIT. A room or space in which people sleep that can include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are part of a *dwelling unit* are not *sleeping units*.

SMALL ELECTRIC MOTOR. A general purpose alternating-current single-speed induction motor.

SOLAR HEAT GAIN COEFFICIENT (SHGC). The ratio of the solar heat gain entering the space through the *fenestration* assembly to the incident solar radiation. Solar heat gain includes directly transmitted solar heat and absorbed solar radiation that is then reradiated, conducted or convected into the space.

SOUTH-ORIENTED. Facing within 45 degrees of true south in the northern hemisphere or facing within 45 degrees of true north in the southern hemisphere.

STANDARD REFERENCE DESIGN. A version of the *proposed design* that meets the minimum requirements of this code and is used to determine the maximum annual energy use requirement for compliance based on total simulated building performance and HVAC total system performance ratio.

STOREFRONT. A system of doors and windows mullied as a composite fenestration structure that has been designed to resist heavy use. *Storefront* systems include, but are not limited to, exterior fenestration systems that span from the floor level or above to the ceiling of the same story on *commercial buildings*, with or without mullied windows and doors.

SUBSTANTIAL IMPROVEMENT. Any *repair*, reconstruction, rehabilitation, *alteration*, *addition* or other improvement of a *building* or structure, the cost of which equals or is more than 50 percent of the market value of the structure before the improvement. Where the structure has sustained substantial damage, as defined in the *International Building Code*, any *repairs* are considered *substantial improvement* regardless of the actual *repair* work performed. *Substantial improvement* does not include the following:

1. Improvement of a *building* ordered by the code official to correct health, sanitary or safety code violations.
2. *Alteration* of a historic building where the *alteration* will not affect the designation as a historic building.

TESTING UNIT ENCLOSURE AREA. The area sum of all the boundary surfaces that define the *dwelling unit*, *sleeping unit* or *conditioned enclosed space*, including top/ceiling, bottom/floor and all side walls. This does not include interior partition walls within the *dwelling unit*, *sleeping unit* or *conditioned enclosed space*. Wall height shall be measured from the finished floor of the *conditioned space* to the finished floor or roof/ceiling *air barrier* above.

THERMAL BLOCK. A generic concept used in energy simulation. It can include one or more thermal zones. It represents a whole *building* or portion of a *building* with the same use type served by the same HVAC system type.

THERMAL BRIDGE. An element or interface of elements that has higher thermal conductivity than the surrounding *building thermal envelope*, which creates a path of least resistance for heat transfer.

THERMAL DISTRIBUTION EFFICIENCY (TDE). The resistance to changes in air heat as air is conveyed through a distance of air *duct*. TDE is a heat loss calculation evaluating the difference in the heat of the air between the air duct inlet and outlet caused by differences in temperatures between the air in the *duct* and the duct material. TDE is expressed as a percent difference between the inlet and outlet heat in the *duct*.

THERMOSTAT. An *automatic* control device used to maintain temperature at a fixed or adjustable setpoint.

TIME-SWITCH CONTROL. An *automatic* control device or system that controls lighting or other loads, including switching off, based on time schedules.

U-FACTOR (THERMAL TRANSMITTANCE). The coefficient of heat transmission (air to air) through a building component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films (Btu/h × ft² × °F) [W/(m² × K)].

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct-expansion (DX) refrigerant system that incorporates a common *condensing unit*, at least one variable-capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and a common communications network. Variable refrigerant flow utilizes three or more steps of control on common interconnecting piping.

VEGETATIVE ROOF. An assembly of interacting components designed to waterproof a building's top surface that includes, by design, vegetation and related landscape elements.

VENTILATION. The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

VENTILATION AIR. That portion of supply air that comes from outside (outdoors) plus any recirculated air that has been treated to maintain the desired quality of air within a designated space.

VISIBLE TRANSMITTANCE (VT). The ratio of visible light entering the space through the fenestration product assembly to the incident visible light. Visible transmittance includes the effects of glazing material and frame and is expressed as a number between 0 and 1.

VISIBLE TRANSMITTANCE, ANNUAL (VT_{annual}). The ratio of visible light entering the space through the fenestration product assembly to the incident visible light during the course of a year, which includes the effects of glazing material, frame, and light well or tubular conduit, and is expressed as a number between 0 and 1.

VOLTAGE DROP. A decrease in voltage caused by losses in the wiring systems that connect the power source to the load.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F (0°C) and less than 55°F (12.8°C) that can be walked into, has a ceiling height of not less than 7 feet (2134 mm) and has a total chilled storage area of less than 3,000 square feet (279 m²).

DEFINITIONS

WALK-IN FREEZER. An enclosed storage space capable of being refrigerated to temperatures at or below 32°F (0°C) that can be walked into, has a ceiling height of not less than 7 feet (2134 mm) and has a total chilled storage area of less than 3,000 square feet (279 m²).

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15 percent above grade and is on the exterior of the *building* or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building. This includes, but is not limited to, between-floor spandrels, peripheral edges of floors, roof knee walls, dormer walls, gable end walls, walls enclosing a mansard roof, mechanical equipment penetrations and skylight shafts.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the *building* that is part of the *building thermal envelope*, is not less than 85 percent below grade and is on the exterior of the building.

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

WEST-ORIENTED. Facing within 45 degrees of true west to the south and within less than 22.5 degrees of true west to the north in the northern hemisphere or facing within 45 degrees of true west to the north and within less than 22.5 degrees of true west to the south in the southern hemisphere.

WORK AREA. That portion or portions of a *building* consisting of all reconfigured spaces as indicated on the *construction documents*. *Work area* excludes other portions of the *building* where incidental work entailed by the intended work must be performed and portions of the building where work not initially intended by the *owner* is specifically required by this code.

ZONE. A space or group of spaces within a *building* with heating or cooling requirements that are sufficiently similar so that desired conditions can be maintained throughout using a single controlling device.

GENERAL REQUIREMENTS

User notes:

About this chapter:

Chapter 3 addresses broadly applicable requirements that would not be at home in other chapters having more specific coverage of subject matter. This chapter establishes climate zone by US counties and territories and includes methodology for determining climate zones elsewhere. It also contains product rating, marking and installation requirements for materials such as insulation, windows, doors and siding.

SECTION C301—CLIMATE ZONES

C301.1 General. Climate zones from Figure C301.1 or Table C301.1 shall be used for determining the applicable requirements from Chapter 4. Locations not indicated in Table C301.1 shall be assigned a climate zone in accordance with Section C301.3.

FIGURE C301.1—CLIMATE ZONES

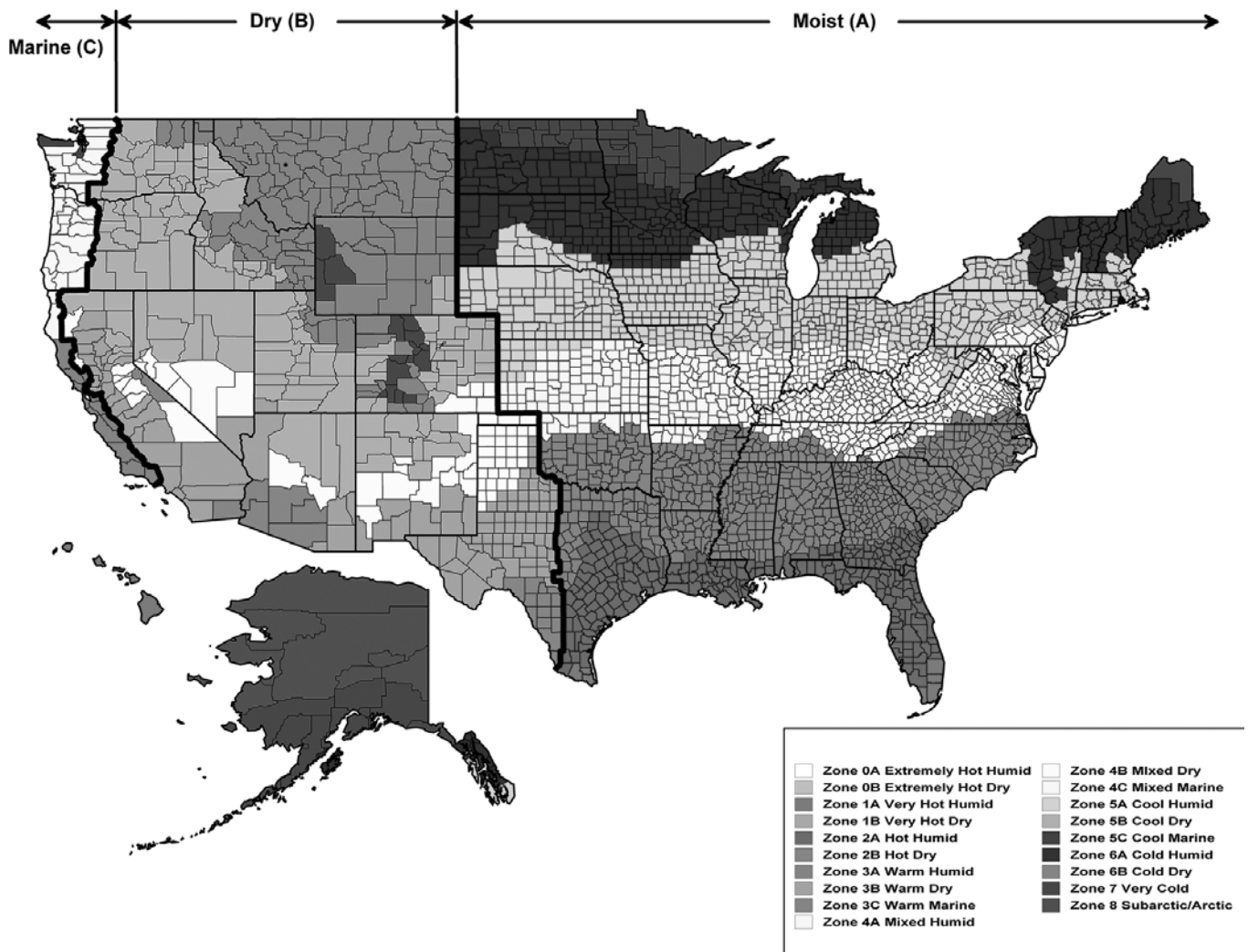


**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a**

US STATES	
ALABAMA	
3A Autauga*	3A Madison
2A Baldwin*	3A Marengo*
3A Barbour*	3A Marion
3A Bibb	3A Marshall
3A Blount	2A Mobile*
3A Bullock*	3A Monroe*
3A Butler*	3A Montgomery*
3A Calhoun	3A Morgan
3A Chambers	3A Perry*
3A Cherokee	3A Pickens
3A Chilton	3A Pike*
3A Choctaw*	3A Randolph
3A Clarke*	3A Russell*
3A Clay	3A Shelby
3A Cleburne	3A St. Clair
2A Coffee*	3A Sumter
3A Colbert	3A Talladega
3A Conecuh*	3A Tallapoosa
3A Coosa	3A Tuscaloosa
2A Covington*	3A Walker
3A Crenshaw*	3A Washington*
3A Cullman	3A Wilcox*
2A Dale*	3A Winston
3A Dallas*	
3A DeKalb	ALASKA
3A Elmore*	7 Aleutians East
2A Escambia*	7 Aleutians West
3A Etowah	7 Anchorage
3A Fayette	7 Bethel
3A Franklin	7 Bristol Bay
2A Geneva*	8 Denali
3A Greene	7 Dillingham
3A Hale	8 Fairbanks North Star
2A Henry*	6A Haines
2A Houston*	6A Juneau
3A Jackson	7 Kenai Peninsula
3A Jefferson	5C Ketchikan Gateway
3A Lamar	6A Kodiak Island
3A Lauderdale	7 Lake and Peninsula
3A Lawrence	7 Matanuska-Susitna
3A Lee	8 Nome
3A Limestone	8 North Slope
3A Lowndes*	8 Northwest Arctic
3A Macon*	5C Prince of Wales Outer Ketchikan
	5C Sitka
	6A Skagway-Hoonah-Angoon
	8 Southeast Fairbanks

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	3A Faulkner
ALASKA (continued)	3A Franklin
7 Valdez-Cordova	4A Fulton
8 Wade Hampton	3A Garland
6A Wrangell-Petersburg	3A Grant
7 Yakutat	3A Greene
8 Yukon-Koyukuk	3A Hempstead*
ARIZONA	3A Hot Spring
5B Apache	3A Howard
3B Cochise	3A Independence
5B Coconino	4A Izard
4B Gila	3A Jackson
3B Graham	3A Jefferson
3B Greenlee	3A Johnson
2B La Paz	3A Lafayette*
2B Maricopa	3A Lawrence
3B Mohave	3A Lee
5B Navajo	3A Lincoln
2B Pima	3A Little River*
2B Pinal	3A Logan
3B Santa Cruz	3A Lonoke
4B Yavapai	4A Madison
2B Yuma	4A Marion
ARKANSAS	3A Miller*
3A Arkansas	3A Mississippi
3A Ashley	3A Monroe
4A Baxter	3A Montgomery
4A Benton	3A Nevada
4A Boone	4A Newton
3A Bradley	3A Ouachita
3A Calhoun	3A Perry
4A Carroll	3A Phillips
3A Chicot	3A Pike
3A Clark	3A Poinsett
3A Clay	3A Polk
3A Cleburne	3A Pope
3A Cleveland	3A Prairie
3A Columbia*	3A Pulaski
3A Conway	3A Randolph
3A Craighead	3A Saline
3A Crawford	3A Scott
3A Crittenden	4A Searcy
3A Cross	3A Sebastian
3A Dallas	3A Sevier*
3A Desha	3A Sharp
3A Drew	3A St. Francis

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	3B San Diego
ARKANSAS <i>(continued)</i>	3C San Francisco
4A Stone	3B San Joaquin
3A Union*	3C San Luis Obispo
3A Van Buren	3C San Mateo
4A Washington	3C Santa Barbara
3A White	3C Santa Clara
3A Woodruff	3C Santa Cruz
3A Yell	3B Shasta
CALIFORNIA	5B Sierra
3C Alameda	5B Siskiyou
6B Alpine	3B Solano
4B Amador	3C Sonoma
3B Butte	3B Stanislaus
4B Calaveras	3B Sutter
3B Colusa	3B Tehama
3B Contra Costa	4B Trinity
4C Del Norte	3B Tulare
4B El Dorado	4B Tuolumne
3B Fresno	3C Ventura
3B Glenn	3B Yolo
4C Humboldt	3B Yuba
2B Imperial	COLORADO
4B Inyo	5B Adams
3B Kern	6B Alamosa
3B Kings	5B Arapahoe
4B Lake	6B Archuleta
5B Lassen	4B Baca
3B Los Angeles	4B Bent
3B Madera	5B Boulder
3C Marin	5B Broomfield
4B Mariposa	6B Chaffee
3C Mendocino	5B Cheyenne
3B Merced	7 Clear Creek
5B Modoc	6B Conejos
6B Mono	6B Costilla
3C Monterey	5B Crowley
3C Napa	5B Custer
5B Nevada	5B Delta
3B Orange	5B Denver
3B Placer	6B Dolores
5B Plumas	5B Douglas
3B Riverside	6B Eagle
3B Sacramento	5B Elbert
3C San Benito	5B El Paso
3B San Bernardino	5B Fremont

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	DELAWARE
COLORADO <i>(continued)</i>	4A (all)
5B Garfield	DISTRICT OF COLUMBIA
5B Gilpin	4A (all)
7 Grand	FLORIDA
7 Gunnison	2A Alachua*
7 Hinsdale	2A Baker*
5B Huerfano	2A Bay*
7 Jackson	2A Bradford*
5B Jefferson	2A Brevard*
5B Kiowa	1A Broward*
5B Kit Carson	2A Calhoun*
7 Lake	2A Charlotte*
5B La Plata	2A Citrus*
5B Larimer	2A Clay*
4B Las Animas	2A Collier*
5B Lincoln	2A Columbia*
5B Logan	2A DeSoto*
5B Mesa	2A Dixie*
7 Mineral	2A Duval*
6B Moffat	2A Escambia*
5B Montezuma	2A Flagler*
5B Montrose	2A Franklin*
5B Morgan	2A Gadsden*
4B Otero	2A Gilchrist*
6B Ouray	2A Glades*
7 Park	2A Gulf*
5B Phillips	2A Hamilton*
7 Pitkin	2A Hardee*
4B Prowers	2A Hendry*
5B Pueblo	2A Hernando*
6B Rio Blanco	2A Highlands*
7 Rio Grande	2A Hillsborough*
7 Routt	2A Holmes*
6B Saguache	2A Indian River*
7 San Juan	2A Jackson*
6B San Miguel	2A Jefferson*
5B Sedgwick	2A Lafayette*
7 Summit	2A Lake*
5B Teller	2A Lee*
5B Washington	2A Leon*
5B Weld	2A Levy*
5B Yuma	2A Liberty*
CONNECTICUT	2A Madison*
5A (all)	2A Manatee*

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
FLORIDA (continued)	
2A Marion*	3A Burke
2A Martin*	3A Butts
1A Miami-Dade*	2A Calhoun*
1A Monroe*	2A Camden*
2A Nassau*	3A Candler*
2A Okaloosa*	3A Carroll
2A Okeechobee*	3A Catoosa
2A Orange*	2A Charlton*
2A Osceola*	2A Chatham*
1A Palm Beach*	3A Chattahoochee*
2A Pasco*	3A Chattooga
2A Pinellas*	3A Cherokee
2A Polk*	3A Clarke
2A Putnam*	3A Clay*
2A Santa Rosa*	3A Clayton
2A Sarasota*	2A Clinch*
2A Seminole*	3A Cobb
2A St. Johns*	2A Coffee*
2A St. Lucie*	2A Colquitt*
2A Sumter*	3A Columbia
2A Suwannee*	2A Cook*
2A Taylor*	3A Coweta
2A Union*	3A Crawford
2A Volusia*	3A Crisp*
2A Wakulla*	3A Dade
2A Walton*	3A Dawson
2A Washington*	2A Decatur*
	3A DeKalb
	3A Dodge*
	3A Dooly*
	2A Dougherty*
	3A Douglas
	2A Early*
	2A Echols*
	2A Effingham*
	3A Elbert
	3A Emanuel*
	2A Evans*
	3A Fannin
	3A Fayette
	3A Floyd
	3A Forsyth
	3A Franklin
	3A Fulton
	3A Gilmer
	3A Glascock
GEORGIA	
2A Appling*	
2A Atkinson*	
2A Bacon*	
2A Baker*	
3A Baldwin	
3A Banks	
3A Barrow	
3A Bartow	
3A Ben Hill*	
2A Berrien*	
3A Bibb	
3A Bleckley*	
2A Brantley*	
2A Brooks*	
2A Bryan*	
3A Bulloch*	

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
GEORGIA (continued)	
2A Glynn*	3A Newton
3A Gordon	3A Oconee
2A Grady*	3A Oglethorpe
3A Greene	3A Paulding
3A Gwinnett	3A Peach*
3A Habersham	3A Pickens
3A Hall	2A Pierce*
3A Hancock	3A Pike
3A Haralson	3A Polk
3A Harris	3A Pulaski*
3A Hart	3A Putnam
3A Heard	3A Quitman*
3A Henry	3A Rabun
3A Houston*	3A Randolph*
3A Irwin*	3A Richmond
3A Jackson	3A Rockdale
3A Jasper	3A Schley*
2A Jeff Davis*	3A Screven*
3A Jefferson	2A Seminole*
3A Jenkins*	3A Spalding
3A Johnson*	3A Stephens
3A Jones	3A Stewart*
3A Lamar	3A Sumter*
2A Lanier*	3A Talbot
3A Laurens*	3A Taliaferro
3A Lee*	2A Tattnall*
2A Liberty*	3A Taylor*
3A Lincoln	3A Telfair*
2A Long*	3A Terrell*
2A Lowndes*	2A Thomas*
3A Lumpkin	2A Tift*
3A Macon*	2A Toombs*
3A Madison	3A Towns
3A Marion*	3A Treutlen*
3A McDuffie	3A Troup
2A McIntosh*	3A Turner*
3A Meriwether	3A Twiggs*
2A Miller*	3A Union
2A Mitchell*	3A Upson
3A Monroe	3A Walker
3A Montgomery*	3A Walton
3A Morgan	2A Ware*
3A Murray	3A Warren
3A Muscogee	3A Washington
	2A Wayne*
	3A Webster*

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	5B Nez Perce
GEORGIA (continued)	6B Oneida
3A Wheeler*	5B Owyhee
3A White	5B Payette
3A Whitfield	5B Power
3A Wilcox*	5B Shoshone
3A Wilkes	6B Teton
3A Wilkinson	5B Twin Falls
2A Worth*	6B Valley
HAWAII	5B Washington
1A (all) *	ILLINOIS
IDAHO	5A Adams
5B Ada	4A Alexander
6B Adams	4A Bond
6B Bannock	5A Boone
6B Bear Lake	5A Brown
5B Benewah	5A Bureau
6B Bingham	4A Calhoun
6B Blaine	5A Carroll
6B Boise	5A Cass
6B Bonner	5A Champaign
6B Bonneville	4A Christian
6B Boundary	4A Clark
6B Butte	4A Clay
6B Camas	4A Clinton
5B Canyon	4A Coles
6B Caribou	5A Cook
5B Cassia	4A Crawford
6B Clark	4A Cumberland
5B Clearwater	5A DeKalb
6B Custer	5A De Witt
5B Elmore	5A Douglas
6B Franklin	5A DuPage
6B Fremont	5A Edgar
5B Gem	4A Edwards
5B Gooding	4A Effingham
5B Idaho	4A Fayette
6B Jefferson	5A Ford
5B Jerome	4A Franklin
5B Kootenai	5A Fulton
5B Latah	4A Gallatin
6B Lemhi	4A Greene
5B Lewis	5A Grundy
5B Lincoln	4A Hamilton
6B Madison	5A Hancock
5B Minidoka	4A Hardin

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
ILLINOIS (continued)	
5A Henderson	4A Richland
5A Henry	5A Rock Island
5A Iroquois	4A Saline
4A Jackson	5A Sangamon
4A Jasper	5A Schuyler
4A Jefferson	5A Scott
4A Jersey	4A Shelby
5A Jo Daviess	5A Stark
4A Johnson	4A St. Clair
5A Kane	5A Stephenson
5A Kankakee	5A Tazewell
5A Kendall	4A Union
5A Knox	5A Vermilion
5A Lake	4A Wabash
5A La Salle	5A Warren
4A Lawrence	4A Washington
5A Lee	4A Wayne
5A Livingston	4A White
5A Logan	5A Whiteside
5A Macon	5A Will
4A Macoupin	4A Williamson
4A Madison	5A Winnebago
4A Marion	5A Woodford
5A Marshall	
5A Mason	INDIANA
4A Massac	5A Adams
5A McDonough	5A Allen
5A McHenry	4A Bartholomew
5A McLean	5A Benton
5A Menard	5A Blackford
5A Mercer	5A Boone
4A Monroe	4A Brown
4A Montgomery	5A Carroll
5A Morgan	5A Cass
5A Moultrie	4A Clark
5A Ogle	4A Clay
5A Peoria	5A Clinton
4A Perry	4A Crawford
5A Piatt	4A Daviess
5A Pike	4A Dearborn
4A Pope	4A Decatur
4A Pulaski	5A De Kalb
5A Putnam	5A Delaware
4A Randolph	4A Dubois
	5A Elkhart
	4A Fayette
	4A Floyd

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
INDIANA (continued)	
5A Fountain	4A Putnam
4A Franklin	5A Randolph
5A Fulton	4A Ripley
4A Gibson	4A Rush
5A Grant	4A Scott
4A Greene	4A Shelby
5A Hamilton	4A Spencer
5A Hancock	5A Starke
4A Harrison	5A Steuben
4A Hendricks	5A St. Joseph
5A Henry	4A Sullivan
5A Howard	4A Switzerland
5A Huntington	5A Tippecanoe
4A Jackson	5A Tipton
5A Jasper	4A Union
5A Jay	4A Vanderburgh
4A Jefferson	5A Vermillion
4A Jennings	4A Vigo
4A Johnson	5A Wabash
4A Knox	5A Warren
5A Kosciusko	4A Warrick
5A LaGrange	4A Washington
5A Lake	5A Wayne
5A LaPorte	5A Wells
4A Lawrence	5A White
5A Madison	5A Whitley
4A Marion	IOWA
5A Marshall	5A Adair
4A Martin	5A Adams
5A Miami	5A Allamakee
4A Monroe	5A Appanoose
5A Montgomery	5A Audubon
4A Morgan	5A Benton
5A Newton	6A Black Hawk
5A Noble	5A Boone
4A Ohio	5A Bremer
4A Orange	5A Buchanan
4A Owen	5A Buena Vista
5A Parke	5A Butler
4A Perry	5A Calhoun
4A Pike	5A Carroll
5A Porter	5A Cass
4A Posey	5A Cedar
5A Pulaski	6A Cerro Gordo
	5A Cherokee
	5A Chickasaw

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
IOWA (continued)	
5A Clarke	5A Marshall
6A Clay	5A Mills
5A Clayton	6A Mitchell
5A Clinton	5A Monona
5A Crawford	5A Monroe
5A Dallas	5A Montgomery
5A Davis	5A Muscatine
5A Decatur	6A O'Brien
5A Delaware	6A Osceola
5A Des Moines	5A Page
6A Dickinson	6A Palo Alto
5A Dubuque	5A Plymouth
6A Emmet	5A Pocahontas
5A Fayette	5A Polk
5A Floyd	5A Pottawattamie
5A Franklin	5A Poweshiek
5A Fremont	5A Ringgold
5A Greene	5A Sac
5A Grundy	5A Scott
5A Guthrie	5A Shelby
5A Hamilton	6A Sioux
6A Hancock	5A Story
5A Hardin	5A Tama
5A Harrison	5A Taylor
5A Henry	5A Union
5A Howard	5A Van Buren
5A Humboldt	5A Wapello
5A Ida	5A Warren
5A Iowa	5A Washington
5A Jackson	5A Wayne
5A Jasper	5A Webster
5A Jefferson	6A Winnebago
5A Johnson	5A Winneshiek
5A Jones	5A Woodbury
5A Keokuk	6A Worth
6A Kossuth	5A Wright
5A Lee	KANSAS
5A Linn	4A Allen
5A Louisa	4A Anderson
5A Lucas	4A Atchison
6A Lyon	4A Barber
5A Madison	4A Barton
5A Mahaska	4A Bourbon
5A Marion	4A Brown
	4A Butler
	4A Chase

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
KANSAS (continued)	
4A Chautauqua	4A Linn
4A Cherokee	5A Logan
5A Cheyenne	4A Lyon
4A Clark	4A Marion
4A Clay	4A Marshall
4A Cloud	4A McPherson
4A Coffey	4A Meade
4A Comanche	4A Miami
4A Cowley	4A Mitchell
4A Crawford	4A Montgomery
5A Decatur	4A Morris
4A Dickinson	4A Morton
4A Doniphan	4A Nemaha
4A Douglas	4A Neosho
4A Edwards	4A Ness
4A Elk	5A Norton
4A Ellis	4A Osage
4A Ellsworth	4A Osborne
4A Finney	4A Ottawa
4A Ford	4A Pawnee
4A Franklin	5A Phillips
4A Geary	4A Pottawatomie
5A Gove	4A Pratt
4A Graham	5A Rawlins
4A Grant	4A Reno
4A Gray	5A Republic
5A Greeley	4A Rice
4A Greenwood	4A Riley
4A Hamilton	4A Rooks
4A Harper	4A Rush
4A Harvey	4A Russell
4A Haskell	4A Saline
4A Hodgeman	5A Scott
4A Jackson	4A Sedgwick
4A Jefferson	4A Seward
5A Jewell	4A Shawnee
4A Johnson	5A Sheridan
4A Kearny	5A Sherman
4A Kingman	5A Smith
4A Kiowa	4A Stafford
4A Labette	4A Stanton
4A Lane	4A Stevens
4A Leavenworth	4A Sumner
4A Lincoln	5A Thomas
	4A Trego
	4A Wabaunsee

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
KANSAS (continued)	
5A Wallace	
4A Washington	
5A Wichita	
4A Wilson	
4A Woodson	
4A Wyandotte	
KENTUCKY	
4A (all)	
LOUISIANA	
2A Acadia*	
2A Allen*	
2A Ascension*	
2A Assumption*	
2A Avoyelles*	
2A Beauregard*	
3A Bienville*	
3A Bossier*	
3A Caddo*	
2A Calcasieu*	
3A Caldwell*	
2A Cameron*	
3A Catahoula*	
3A Claiborne*	
3A Concordia*	
3A De Soto*	
2A East Baton Rouge*	
3A East Carroll	
2A East Feliciana*	
2A Evangeline*	
3A Franklin*	
3A Grant*	
2A Iberia*	
2A Iberville*	
3A Jackson*	
2A Jefferson*	
2A Jefferson Davis*	
2A Lafayette*	
2A Lafourche*	
3A La Salle*	
3A Lincoln*	
2A Livingston*	
3A Madison*	
3A Morehouse	
3A Natchitoches*	

2A Orleans*	
3A Ouachita*	
2A Plaquemines*	
2A Pointe Coupee*	
2A Rapides*	
3A Red River*	
3A Richland*	
3A Sabine*	
2A St. Bernard*	
2A St. Charles*	
2A St. Helena*	
2A St. James*	
2A St. John the Baptist*	
2A St. Landry*	
2A St. Martin*	
2A St. Mary*	
2A St. Tammany*	
2A Tangipahoa*	
3A Tensas*	
2A Terrebonne*	
3A Union*	
2A Vermilion*	
3A Vernon*	
2A Washington*	
3A Webster*	
2A West Baton Rouge*	
3A West Carroll	
2A West Feliciana*	
3A Winn*	
MAINE	
6A Androscoggin	
7 Aroostook	
6A Cumberland	
6A Franklin	
6A Hancock	
6A Kennebec	
6A Knox	
6A Lincoln	
6A Oxford	
6A Penobscot	
6A Piscataquis	
6A Sagadahoc	
6A Somerset	
6A Waldo	
6A Washington	
6A York	

Documents

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
MARYLAND	
5A Allegany	6A Clare
4A Anne Arundel	5A Clinton
4A Baltimore	6A Crawford
4A Baltimore (city)	6A Delta
4A Calvert	6A Dickinson
4A Caroline	5A Eaton
4A Carroll	6A Emmet
4A Cecil	5A Genesee
4A Charles	6A Gladwin
4A Dorchester	6A Gogebic
4A Frederick	6A Grand Traverse
5A Garrett	5A Gratiot
4A Harford	5A Hillsdale
4A Howard	6A Houghton
4A Kent	5A Huron
4A Montgomery	5A Ingham
4A Prince George's	5A Ionia
4A Queen Anne's	6A Iosco
4A Somerset	6A Iron
4A St. Mary's	6A Isabella
4A Talbot	5A Jackson
4A Washington	5A Kalamazoo
4A Wicomico	6A Kalkaska
4A Worcester	5A Kent
MASSACHUSETTS	
5A (all)	7 Keweenaw
MICHIGAN	
6A Alcona	6A Lake
6A Alger	5A Lapeer
5A Allegan	6A Leelanau
6A Alpena	5A Lenawee
6A Antrim	5A Livingston
6A Arenac	6A Luce
6A Baraga	6A Mackinac
5A Barry	5A Macomb
5A Bay	6A Manistee
6A Benzie	7 Marquette
5A Berrien	6A Mason
5A Branch	6A Mecosta
5A Calhoun	6A Menominee
5A Cass	5A Midland
6A Charlevoix	6A Missaukee
6A Cheboygan	5A Monroe
6A Chippewa	5A Montcalm
	6A Montmorency
	5A Muskegon
	6A Newaygo
	5A Oakland

**TABLE C301.1—CLIMATE ZONES, MOISTURE REGIMES AND WARM HUMID DESIGNATIONS
BY STATE, COUNTY AND TERRITORY^a—continued**

US STATES—continued	
MICHIGAN (continued)	
6A Oceana	6A Freeborn
6A Ogemaw	6A Goodhue
6A Ontonagon	6A Grant
6A Osceola	6A Hennepin
6A Oscoda	5A Houston
6A Otsego	7 Hubbard
5A Ottawa	6A Isanti
6A Presque Isle	7 Itasca
6A Roscommon	6A Jackson
5A Saginaw	6A Kanabec
5A Sanilac	6A Kandiyohi
6A Schoolcraft	7 Kittson
5A Shiawassee	7 Koochiching
5A St. Clair	6A Lac qui Parle
5A St. Joseph	7 Lake
5A Tuscola	7 Lake of the Woods
5A Van Buren	6A Le Sueur
5A Washtenaw	6A Lincoln
5A Wayne	6A Lyon
6A Wexford	7 Mahanomen
MINNESOTA	
7 Aitkin	7 Marshall
6A Anoka	6A Martin
6A Becker	6A McLeod
7 Beltrami	6A Meeker
6A Benton	6A Mille Lacs
6A Big Stone	6A Morrison
6A Blue Earth	6A Mower
6A Brown	6A Murray
7 Carlton	6A Nicollet
6A Carver	6A Nobles
7 Cass	7 Norman
6A Chippewa	6A Olmsted
6A Chisago	6A Otter Tail
6A Clay	7 Pennington
7 Clearwater	7 Pine
7 Cook	6A Pipestone
6A Cottonwood	7 Polk
7 Crow Wing	6A Pope
6A Dakota	6A Ramsey
6A Dodge	7 Red Lake
6A Douglas	6A Redwood
6A Faribault	6A Renville
5A Fillmore	6A Rice
	6A Rock
	7 Roseau
	6A Scott